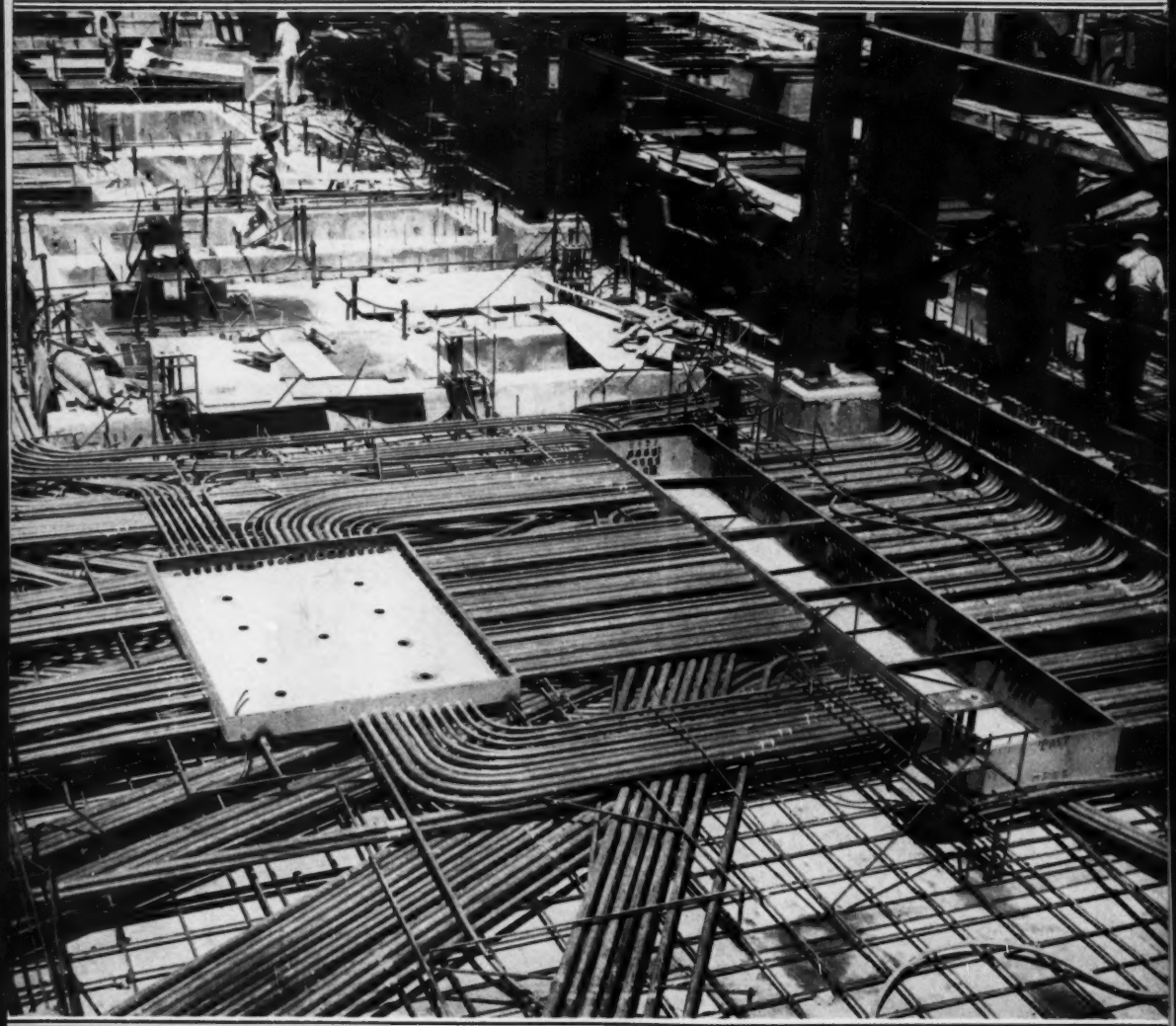
ELECTRICAL WEST

March 1952
25 Cents



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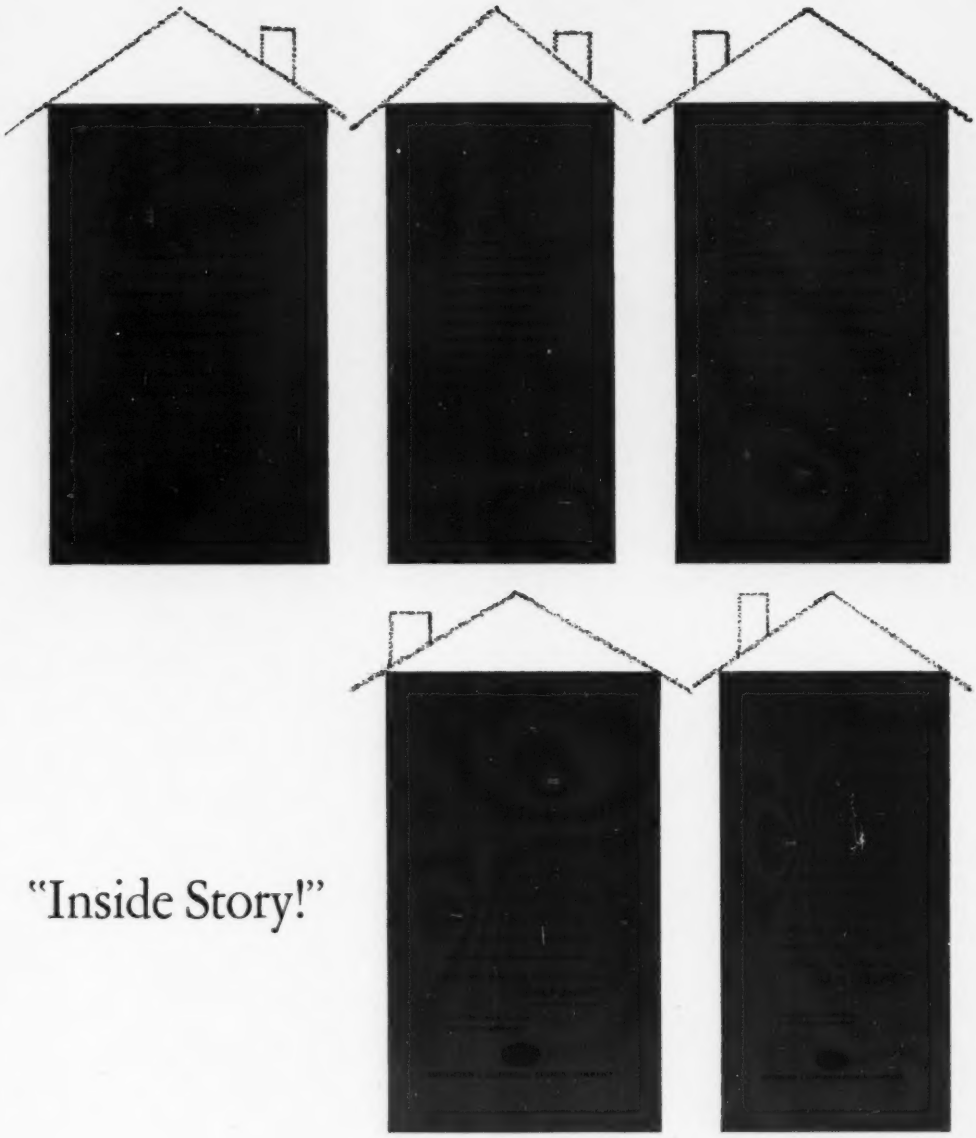
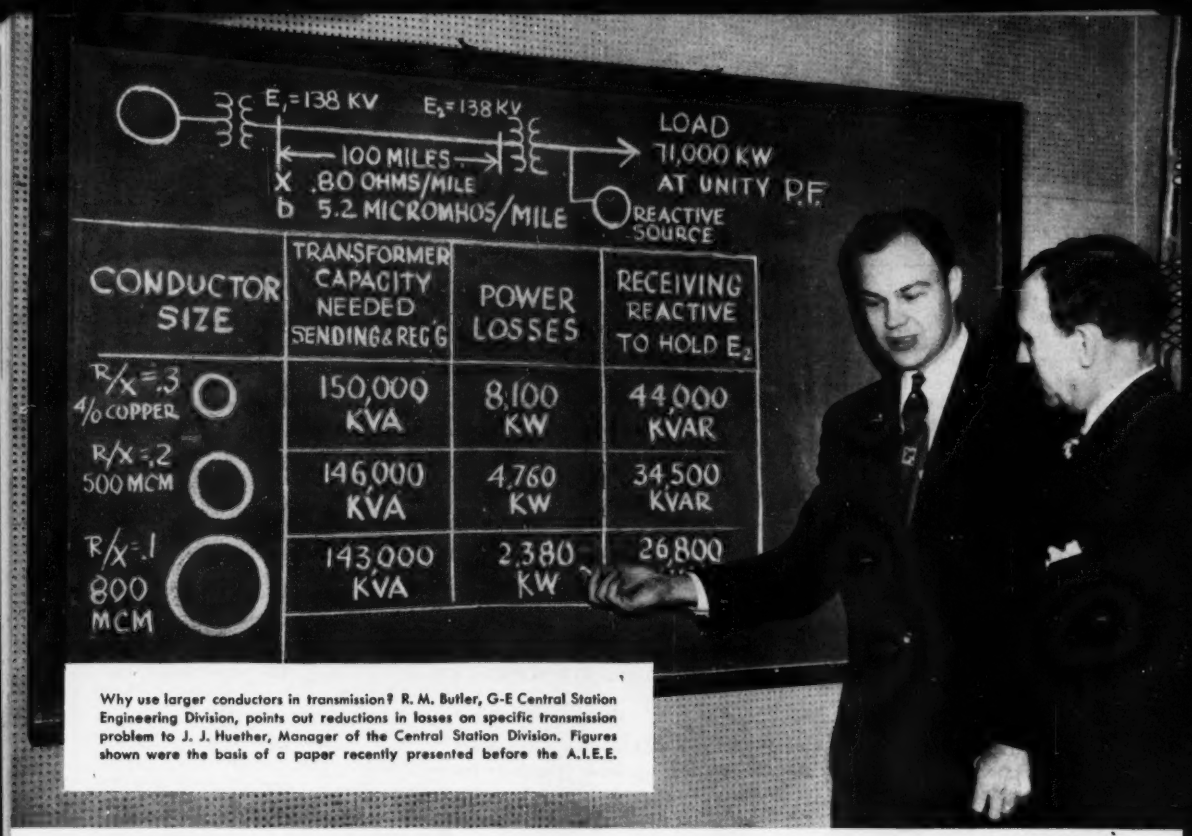
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.



"Inside Story!"

Outdoor living is something Southern California is noted for. But hanging up the clothes out in the yard on laundry day is an aspect which this area's homemakers dislike in common with their sisters the country over. It is just as unhandy an activity here as elsewhere, just as inconvenient, just as disagreeable in bad weather. All of which makes a good selling story for indoor drying. And Edison advertisements on electric clothes dryers are helping the appliance dealers of Central and Southern California to tell it.

Edison SOUTHERN CALIFORNIA EDISON COMPANY



Why use larger conductors in transmission? R. M. Butler, G-E Central Station Engineering Division, points out reductions in losses on specific transmission problem to J. J. Huether, Manager of the Central Station Division. Figures shown were the basis of a paper recently presented before the A.I.E.E.

Don't overlook bigger transmission conductors in planning for future loads

Applications of large ACSR conductors are appraised by G-E sponsor engineers P. H. Light and C. A. Woodrow with R. C. Buell, Manager of the Sponsor Division—one phase of the Division's continuing interest in utility problems.

New thinking on conductor sizes promises greater capacity for expansion, reduced losses and lower kw-hr costs

Most of the conductors used on today's transmission lines are relatively small—about 4/0 copper at 110- to 138-kv levels. With growing demands requiring the transmission of larger and larger blocks of power, these lines tend to become bottlenecks to expansion. Why not plan with larger conductor sizes—particularly at new higher voltages—and provide for higher capacity at the start?

Bigger conductors than those in general use today will not only provide for heavier loadings per circuit, but may also reduce the cost of delivering energy. With their lower r/x ratios, larger conductors require substantially less reactive kva to support the receiving voltage. Transmission losses, of course, are also reduced. Because of lower losses and lower kvar requirements, significant additional savings can be made in transformer capacity.

Maybe now is the time to review future loads and established practices in the choice of conductor sizes. For a complete discussion of the subject, write for a copy of the paper GER-511: "Conductor Size—Its Importance in Transmission." General Electric Company, Schenectady 5, N. Y.

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With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

MARCH 1952

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VOL. 108 NO. 3

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Coetz, Typography

Next Month

The Cowlitz development of the City of Tacoma, finally approved by FPC, will be described in the April issue. This is an important nonfederal project in the Northwest.

Savings made by utility use of two-way FM radio have been evaluated by one company. Analysis of these makes a most worthwhile article.

Further experiment by Portland Electric Co. with field spun aerial secondary cable using aluminum conductors will add importantly to the literature on use of aluminum for urban distribution.

Functional layout of a new storeroom and service center will interest a lot of utility people.

How a Western utility built a semioutdoor 66,000-kw steam plant for $86.83 per kw is news.

A unique new device called Amp-trap for opening short-circuit currents of the order of 100,000 amp in low-voltage circuits will be described. Those interested in infrared applications will learn about an all-infrared restaurant near Portland where even cakes and pies are baked with this type of heat.

Two articles will deal with industrial plant wiring systems. Another will show the application of low-voltage control in a new TV studio.

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Cover: Conduit forms an intricate pattern during construction work at the Pittsburg, Calif., plant of Columbia-Geneva Steel Division, United States Steel. Conduit for the new four-stand, cold reduction mill ranges in size from one to four inches; extends nearly 10 miles to cover some 50 miles of electrical wiring cable.

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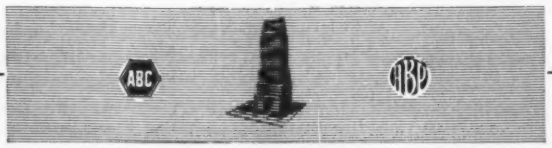

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NEW! EXCLUSIVE!
L-M's 7.5 KV "FAMILY"
of cutouts with interchangeable doors!

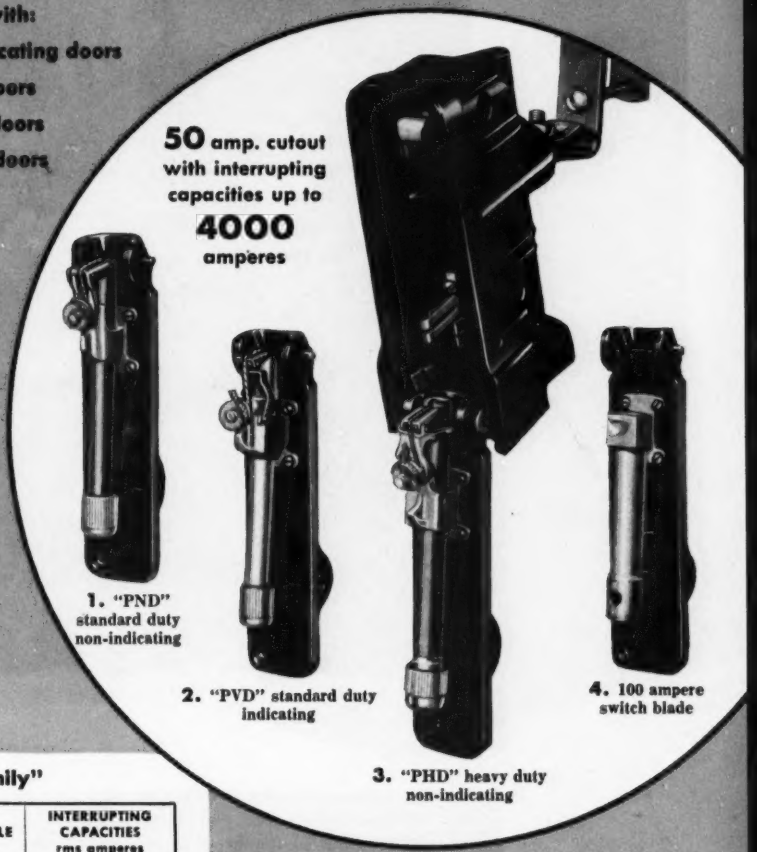
50 and 100 ampere cutouts, each with:
new "PND" standard duty non-indicating doors
"PVD"® standard duty indicating doors
"PHD" heavy duty non-indicating doors
100 and 200 ampere switch blade doors

Here's another L-M "first"! The new 7500-volt family of 50 and 100 ampere cutouts, each with four interchangeable doors to meet a wide variety of services. As operating requirements change, you simply change a door—in 6 seconds the job is done! Saves warehousing, saves installation time, saves in operation.

Safer, too. Doors are removed or hooked on, all with the switch stick. When door is open, all parts are dead.

GET THE WHOLE STORY

Ask the L-M Field Engineer for details on L-M's new "first families"—the 7500-volt family shown here, *and L-M's new 5000-volt family*, also! Or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).


50 amp. cutout with interrupting capacities up to 4000 amperes
1. "PND" standard duty non-indicating
2. "PVD" standard duty indicating
3. "PHD" heavy duty non-indicating
4. 100 ampere switch blade

L-M's new 7.5 kv "Family"

RATING	INTERCHANGEABLE DOORS AVAILABLE	INTERRUPTING CAPACITIES rms amperes
50 AMPERES	1. "PND" standard duty non-indicating	1200 amperes
	2. "PVD" standard duty indicating	1200
	3. "PHD" heavy duty non-indicating	4000
	4. Switch Blade — 100 amperes continuous current rating	
100 AMPERES	5. "PND" standard duty non-indicating	3000 amperes
	6. "PVD" standard duty indicating	3000
	7. "PHD" heavy duty non-indicating	8000*
	8. Switch Blade — 200 amperes continuous current rating	

"PND", "PVD", AND "PHD" are L-M Trademarks

*Available soon

100 amp. cutout with interrupting capacities up to 8000 amperes

5. "PND" standard duty non-indicating
6. "PVD" standard duty indicating
7. "PHD" heavy duty non-indicating
8. 200 ampere switch blade

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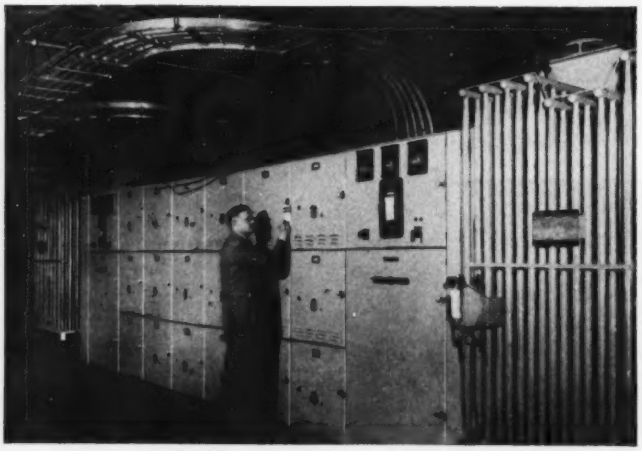
fuse cutouts

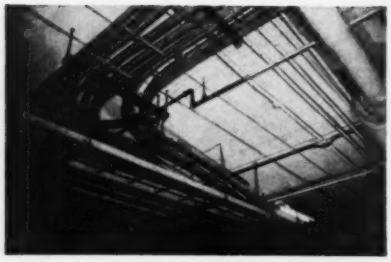
Complete Coordinated Equipment for Distribution Today

TANK PLANT GETS ROLLING IN RECORD TIME

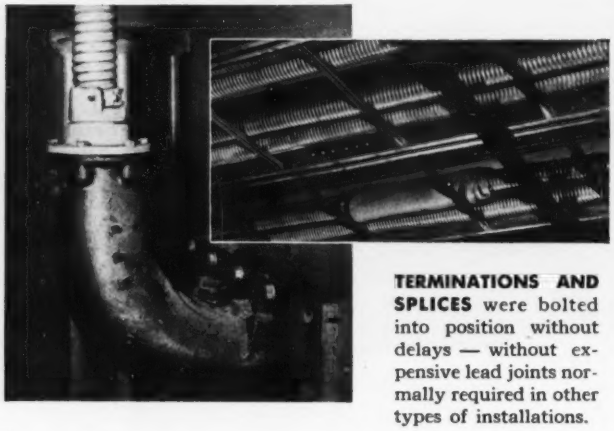
. . . with G-E Interlocked Armor Cable



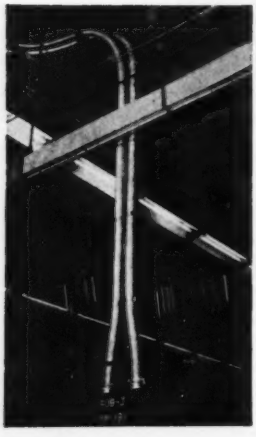
FROM WAREHOUSE TO TANK PLANT in less than a year. That's the latest record of this midwest tank plant. This 53-acre tank plant was sped into production with flexible, adaptable G-E interlocked armor cable installed on Stacey aluminum racks.



INSTALLATION SPEED was a real advantage on main-feeder runs. Racks were quickly hung from ceiling and cables were pulled into place. There was no need to fit raceways and pull cables through.



TERMINATIONS AND SPLICES were bolted into position without delays — without expensive lead joints normally required in other types of installations.



NO THREADING, NO PRE-BENDING required on this run. Hours of bending time were saved on this secondary circuit. Threading and fitting at panel box were eliminated.

COMPLETE DATA ON ADVANTAGES

Get the story on installation speed with G-E interlocked armor cables from booklet 19-320. Write Section W11-325, Construction Materials Division, General Electric Company, Bridgeport 2, Conn.

You can put your confidence in—

GENERAL ELECTRIC

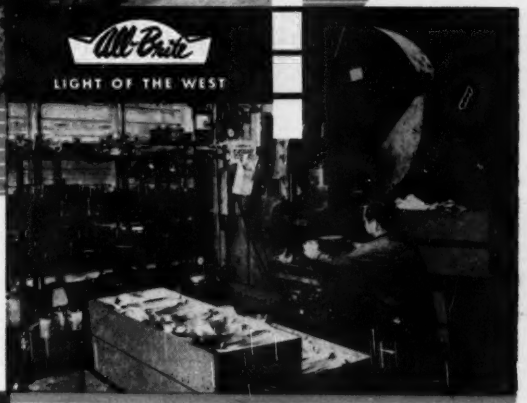
it takes ULTRA-PRECISION and PLENTY OF EXPERIENCE to make better fluorescent fixtures...

ALL-BRITE'S OWN TOOL-AND-DIE DEPARTMENT GIVES YOU BOTH

upper left: Turning stock to extra-fine tolerances on his lathe is part of this All-Brite veteran's daily work.

[illegible] master's finesse and art are developed by this master All-Brite tool-and-die maker in meeting dimensions with extraordinarily precise instruments.

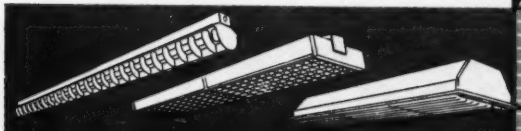
bottom, right: One of All-Brite's many punch presses. Back ground wall shows a section of enormous stock of handy tools and dies.



another PLUS in lighting value

The degree of craftsmanship required to fabricate All-Brite quality luminaires is so exacting that tools and dies for stamping and forming are made in All-Brite's OWN modern tool-and-die shop by super-skilled experts, under the careful scrutiny of All-Brite top engineers. No wonder All-Brite fixtures are preferred in the West for efficiency, performance and durability! Write for complete catalog.

FLUORESCENT FIXTURES OF CALIFORNIA



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SAFETY m.i. WIRING is available with fittings to connect to standard boxes and equipment.

SIZES 16 TO 4/0 A.W.G. | SIZES 16 TO 4 A.W.G. | SIZES 16 TO 4 A.W.G. | SIZES 16 TO 6 A.W.G. | SIZES 16 TO 10 A.W.G.

permanent
ELECTRICAL WIRING

...Wiring that will actually outlast the buildings in which it is installed.

Whatever the service, wherever the installation, if the job deserves the ultimate in quality of the wiring material, nothing less than a Safety m.i. Wiring System will suffice.

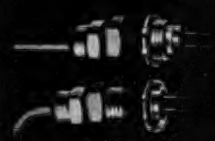
Uni-drawn, self-protected Wiring System, with dry mineral insulation offers the utmost in permanence, service-reliability and safety in all applications up to 600 volts.

As shown, this new General Cable wiring installs easily, with standard boxes, switches, etc. Its advantages are so unusual, so important that you will want to read this summary...and should.

***Exclusively a General Cable product*

OUTLASTS STRUCTURE IN WHICH INSTALLED!
Immune to age-deterioration due to its "all-mineral" construction. Unaffected by high temperatures resulting from current overloads, either accidently imposed or to meet emergency increased power demands.

ONE-STEP INSTALLATION!
No additional mechanical protection required. Safety m.i. Wiring is its own conduit, installed in one operation with standard switch and junction boxes. Smaller diameter saves space, gives neat appearance.

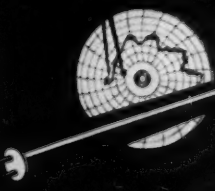


NO VAPOR PASSAGE!
Completely filled with compacted mineral insulation. No need for specially installed seals in the cable run normally required to prevent the passage of combustible gases through a wiring system.

COMPLETELY MOISTURE-PROOF!
Simple fittings permanently seal both ends of each run of wiring. No possible entrance for moisture. Normal concern over this hazard is, thereby, completely eliminated.

RIGID YET FLEXIBLE!
Thumb-pressure bending, in ordinary sizes, easily fashions orderly wall patterns — conforms wiring to any contour. Once formed, and fastened with standard clamps or straps, Safety m.i. Wiring stays put rigidly.

NO HEAT DETERIORATION!
The mineral insulation of Safety m.i. Wiring is physically stable up to 2800° C., thereby assuring against deterioration by heat, even beyond the melting point (1083° C.) of the copper sheath.



Note the smooth transition bends in this bank of power plant circuits.

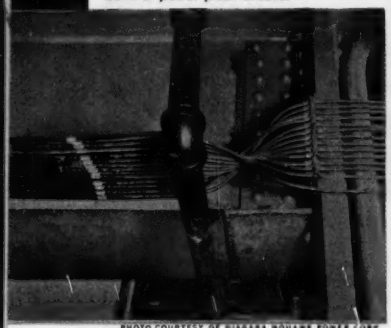
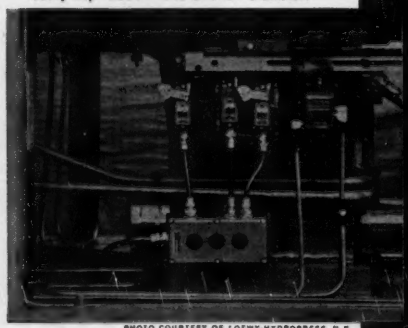


PHOTO COURTESY OF NIAGARA MOHAWK POWER CORP.

Typical close-up of machine wiring, smooth, easily kept clean — and of small diameter.



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MAGNETIC POLARITY CAP FOR INDICATION OF POLARITY OF D.C. SYSTEMS
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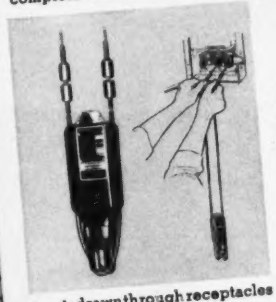
30" HEAVY DUTY OIL-RESISTING RUBBER LEADS WITH SHARP STEEL-TIPPED INSULATED PRODS
"RUBBER PANTS" PROTECT LEAD CONNECTIONS TO TESTER

Plastic case designed to completely house prods when tester is not in use.

Two-hand testing with one prod inserted in receptacle. Notice complete visibility of scale.



Leads drawn through receptacles for overhead testing. Notice complete eye-level visibility.

HERE IS DESIGN LEADERSHIP *IN ACTION...*

• providing the most convenient, durable, safe, versatile tester in years! Positive voltage identification. No lamps to break or burn out. Only one moving part. So compact it can be carried in pocket—so rugged it can be carried in tool box without damage. No other tester gives you so many usable features.

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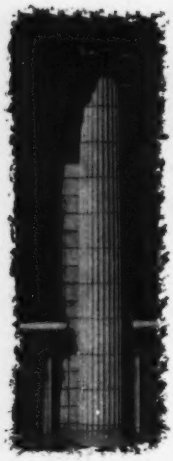

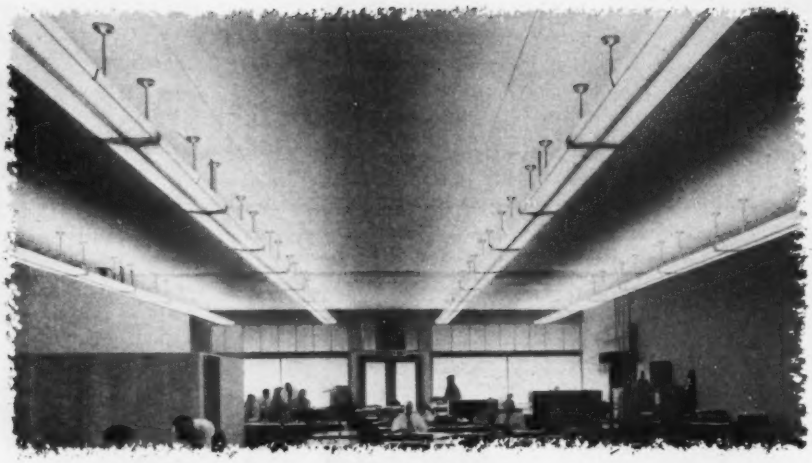

SUNBEAM BUILDS LIGHTING FIXTURES FOR EVERY PURPOSE

Industrial plants are building for greater rates of production, business offices have more urgent demands for speed and accuracy, stores and markets are enhancing sales appeal. On final analysis, everything depends on scientifically planned illumination. Sunbeam builds luminaires not for style alone but for specific light distributions. Advanced concepts of illuminating engineering are used in the design of all Sunbeam fixtures.

Pictured above is an installation of Sunbeam #L1284-96 units in the engineering and drafting departments of a guided missiles plant. 110 ft/c (maintained) of even illumination was achieved. The modern office shown at the left has #L1214-48 units, ceiling mounted in continuous rows. For efficiency, low brightness and easy maintenance, these units are highly recommended. The large installation of #H8080 series in a west coast university library, shown below, is typical of how Sunbeam fixtures meets the demands of critical seeing.

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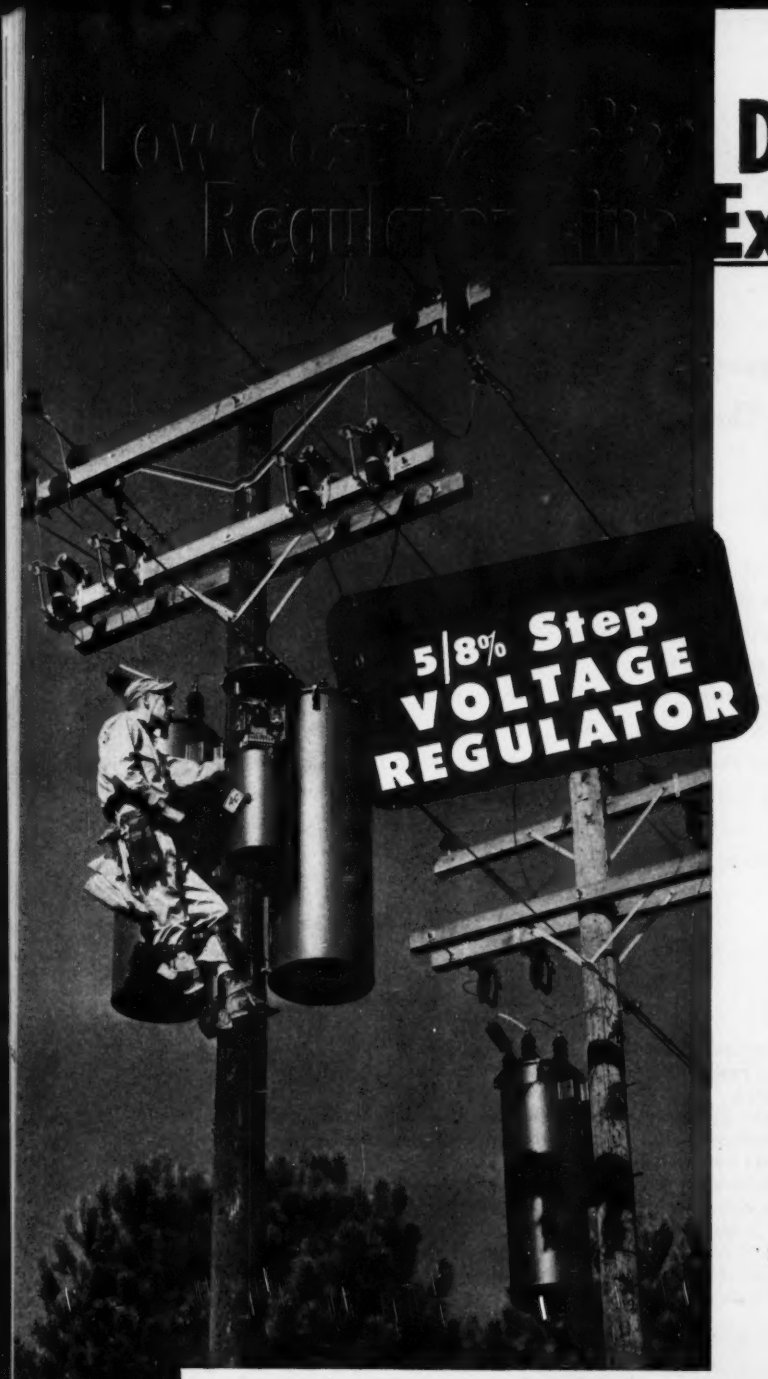

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The low price tag on Allis-Chalmers JFR 5/8% step regulator line means that the advantages of voltage regulation can now be brought to marginal lines where equipment costs were too high before. And even though the price tag is low, there's no reduction in quality with the JFR. You get all the advantages of Allis-Chalmers 5/8% step voltage regulation: 5/8% steps, ± 1 volt band, 20% range of regulation, close average voltage maintained by voltage integrator, life long contacts, tap changing and drive mechanism with balanced spring action to eliminate shock, and unit construction for easier maintenance.

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RATINGS NOW AVAILABLE

7620 volts	5000 volts	2500 volts
15 amp	50 amp	100 amp
50 amp	100 amp	200 amp
100 amp		

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Originators of 5/8% Step Regulators

now! Rome

The SUPERIOR Heavy-Duty Steel Conduit With These Exclusive Features:

- ***Cold formed from sheet steel***
- ***Electrically welded seam***
- ***Hot-dip galvanized by Sendzimir* process***

Now, with the introduction of Rome·RIGID you can look to Rome Cable for all conduit requirements. Manufactured to the same high quality standards as Rome·EMT, thin wall conduit, Rome·RIGID *is new . . . is different.* It is the *only* rigid steel conduit cold formed directly from shot-blasted carbon steel sheet . . . providing the cleanest possible surface without oxidation and scale as in the case of hot formed pipe. It is the *only* rigid steel conduit welded electrically . . . providing superiority in uniformity of ductility, strength, dimensions and concentricity. Further, it is the *one and only* rigid steel conduit hot-dip galvanized by the patented Sendzimir* process . . . the last word in superior zinc coating on steel.

* Under license agreement, Rome Cable is the first and only manufacturer to apply the famous Armco method of zinc coating sheet steel to the hot-dip galvanizing of rigid steel conduit.

In the Sendzimir process, the formed pipe is precisely heated, uniformly oxidizing inside and outside surfaces and completely burning off all possible surface grease or dirt. Conveyed into another furnace under a carefully controlled reducing atmosphere, the oxide coating is reduced to virgin metal. Actually, the furnace atmosphere of hydrogen combines with the oxygen in the oxide coating to turn the pipe surface to a mirror brightness of stainless steel. Here is the cleanest metal surface known. Cooled in the same atmosphere to a heat just above the temperature of the zinc bath, the bright pipe enters the molten zinc without ever coming in contact with air. Its virgin clean surface is instantly coated with pure zinc, inside and out.

The Sendzimir process produces a superior zinc coating for long life protection. It eliminates flux which is often trapped and eventually eats its way through the zinc. It provides a perfect and uniform bond between bright, clean, raw metal and molten zinc. It is a process that has been used on sheet steel by Armco for fourteen years in establishing a standard of quality unrivalled in the steel industry.

"Clean as a Shot Gun Barrel"

With its clean enamel finish over a galvanized surface, Rome • RIGID presents a mirror smooth interior for easy fishing of wires with no burrs or rough edges. Like its companion Rome • EMT, thin wall conduit, Rome • RIGID is known for being as "clean as a shot gun barrel."

Rome • RIGID is available in 10 foot straight lengths, as well as 90° elbows. Sizes are ½", ¾", 1", 1¼", 1½" and 2". Fully approved by Underwriters' Laboratories, Inc., it meets all requirements for safe, heavy-duty steel raceway . . . plus uniformly high quality. See your electrical wholesaler or call your nearest Rome Cable office today.

It Costs Less
To Buy The Best!

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

WESTERN SALES OFFICES AND WAREHOUSES

SALT LAKE CITY 1, UTAH
230 South 4th West St.

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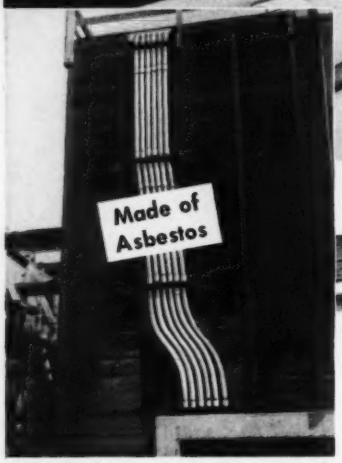
SAN FRANCISCO 24, CALIF.
1100 Selby Street

SEATTLE 4, WASH.
3404 Fourth Ave., So.

DENVER 3, COLO.
1160 Elati St.

Installed over 18 years ago on this bridge, Transite Conduit is still on the job despite the attack of corrosive fumes, weather, and vibration.



Resists the Elements: Transite Ducts are standing up far longer than other materials on this cooling-tower wall despite corrosive conditions. Transite's exceptional corrosion-resistance practically eliminates maintenance and replacement costs through the years.

Outlasts other Materials: When other ducts failed to stand up under the streets of a city in the Far West, Transite Ducts were installed. Their life expectancy is far greater than that of the ducts they have replaced.

That's why TRANSITE® DUCTS stay on the job despite corrosive fumes, soils and weather

If you're looking for a conduit that will stand up for years in tough service . . . use Transite Ducts that not only resist corrosion but are immune to electrolysis, too.

Transite, you see, is made of asbestos and cement . . . two naturally corrosion-resistant materials. It stands up in corrosive cinder fills, salt marshes, and other troublesome soils. It also withstands the attack of smoke, fumes . . . and weather conditions will not shorten its service life. Since it is inorganic and nonmetallic, Transite also is immune to electrolysis or galvanic action.

You will find that Transite Ducts save you money on your cableway system not only by staying on the job longer . . . but by holding down the initial cost, too. For further information write Johns-Manville, Box 290, New York 16, N. Y.

4 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

1. Incombustible. Transite will not burn or contribute to formation of smoke, gases, or fumes. It confines burnouts and protects adjacent cables.

2. Permanently Smooth Bore. Transite makes long cable pulls easy. Danger of damage to cables is also minimized.

3. Easy To Install. Transite Ducts are light weight, easy to handle. Joints are quickly made. And, long 10-foot lengths reduce the number of joints in the line.

4. Higher Thermal Conductivity. Cables run cooler in Transite Ducts, reducing I^2R losses, increasing current capacity, and prolonging insulation life.

JOHNS-MANVILLE JM PRODUCTS

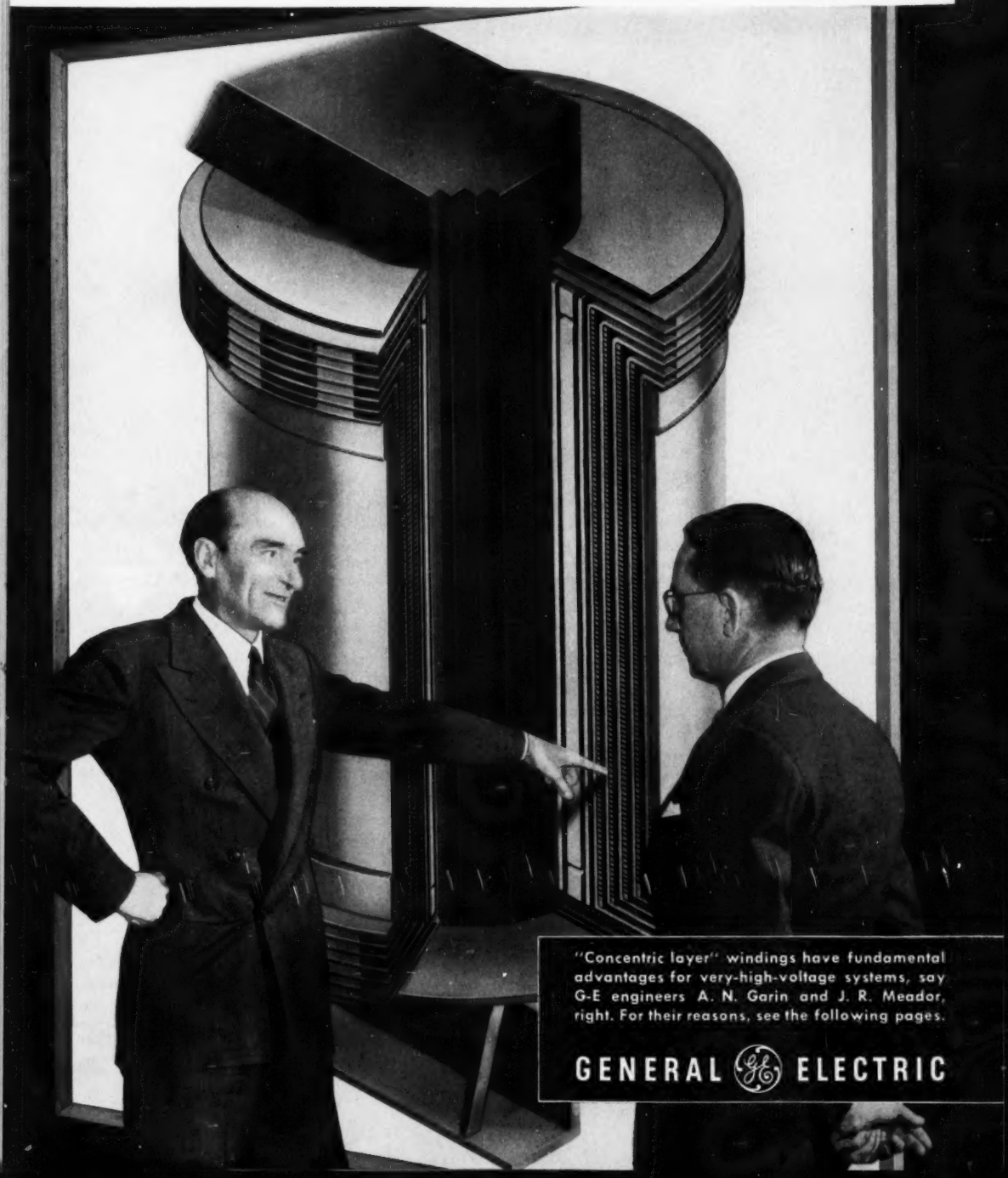
Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

Here's "CONCENTRIC LAYER"

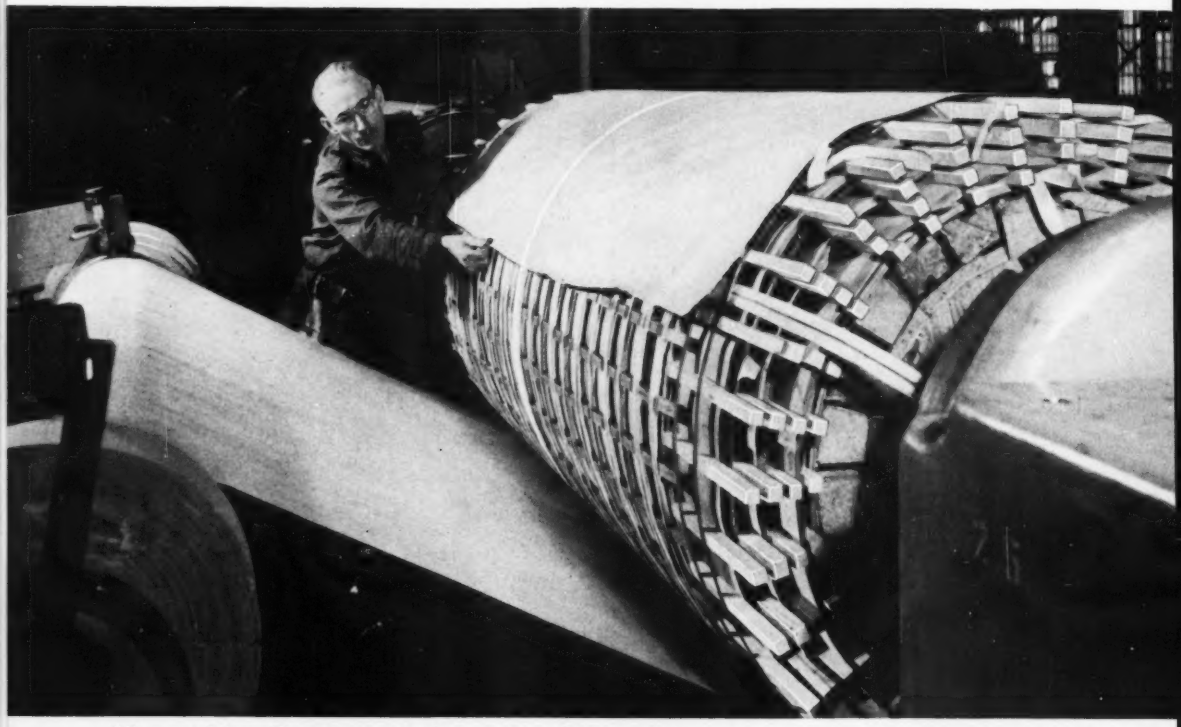
An outstanding development in very-high-voltage transformer design



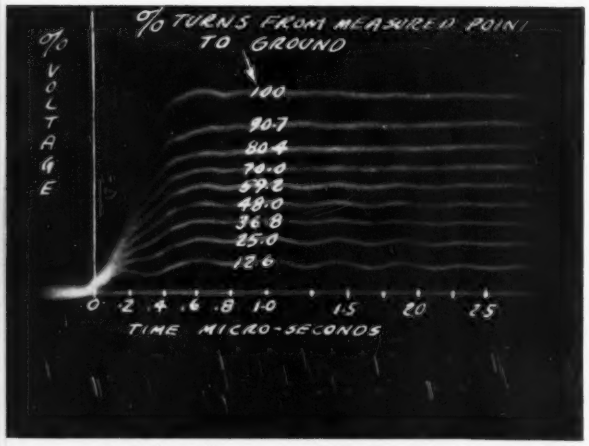
"Concentric layer" windings have fundamental advantages for very-high-voltage systems, say G-E engineers A. N. Garin and J. R. Meador, right. For their reasons, see the following pages.

GENERAL ELECTRIC

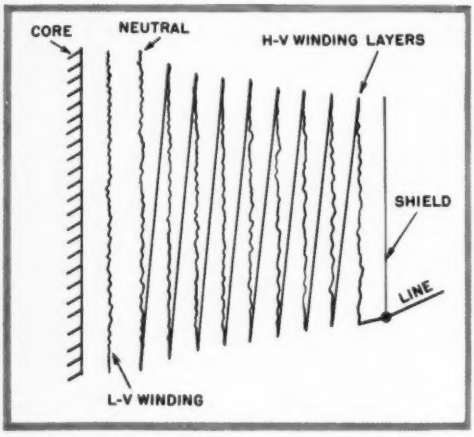
the power transformer winding that



"Concentric layer" winding for 42,500-kva, 230-kv/132.8-kv GrY transformer. Workman is starting a layer of Kraft paper insulation. Other layers of insulation can be seen at the near end—separated by temporary wooden spacers. Later, these wooden spacers will be removed and the insulation will be flanged over the ends of the windings.



Actual oscillogram showing voltage to ground at equally spaced points in the winding when 0.6 x 190 microsecond impulse wave was applied to line end. Absence of large oscillation is indicative of uniform impulse distribution.



Winding connection diagram shows that voltages between layers and between high- and low-voltage windings are only the voltage of one layer since successive layers are connected in series progressively.

meets all the requirements for very high voltage

"Concentric Layer" Windings Provide Important Advantages on All G-E Transformers 750-kv BIL And Above

• **Uniform distribution of impulse voltages** and the elimination of harmful oscillations are characteristic of "concentric layer" construction. As a result, voltage stresses can be calculated accurately and insulation applied precisely as required.

• **Lower weights and dimensions.** Voltage stresses between the low- and high-voltage windings are reduced to a fraction of those occurring with other types of construction. Space factor is improved, and the reduction in weights and dimensions permits a larger kva unit to be built in a one-piece tank.

• **Effective inter-layer cooling.** Vertical ducts between layers permit unrestricted oil flow past each conductor.

• **Greater mechanical strength.** Major magnetic stresses in the "concentric layer" winding appear as *tensile* forces. These are inherently easier to withstand than the *bending* forces which occur in non-concentric designs. A full-size "concentric layer" transformer successfully passed short-circuit tests at *rated* voltage, demonstrating the great mechanical strength of these windings.

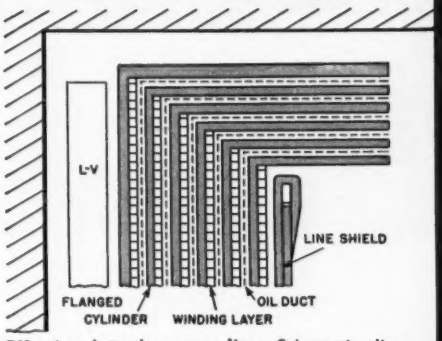
G-E "concentric layer" transformers now being built at a rate of 2,500,000 kva per year!

Calculations and tests show that from every angle the "concentric layer" winding is superior. Since 1940, all new G-E transformer designs, 750-kv BIL and above, have included this winding. Today, with the rising trend to higher system voltages, shipments of G-E "concentric layer" transformers are exceeding 2,500,000 kva per year!

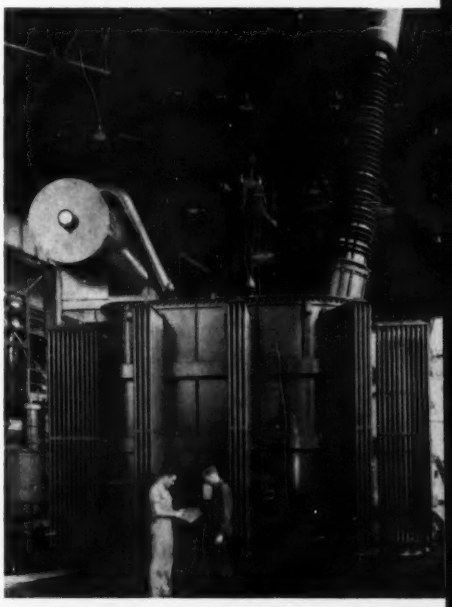
If you are contemplating voltages of 161-kv and above, you may wish to review the data on these windings. Ask for GER-129. Address inquiries to your nearest G-E Apparatus Sales Office, or write directly to Section 401-23 General Electric Company, Schenectady 5, New York.

"Concentric layer" windings consist of a number of cylindrical layers arranged concentrically, as shown on these pages. The innermost layer, adjacent to the low-voltage winding, is connected to the neutral. Then, successive layers are connected in series progressively, with the outer layer being connected to the line.

Basic insulation is provided by cylinders of insulating material. These cylinders are flanged over the ends of the winding to eliminate creepage paths in the direction of high electrical stress. The *entire* winding is protected from transient voltage stresses by electrostatic shielding.



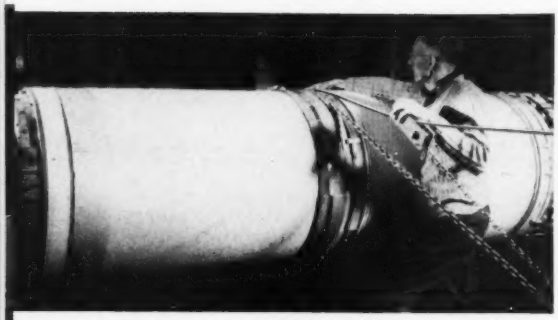
Effective inter-layer cooling. Schematic diagram of "concentric layer" winding showing six layers insulated by flanged cylinders. Dotted lines show path of oil past each turn of the winding.



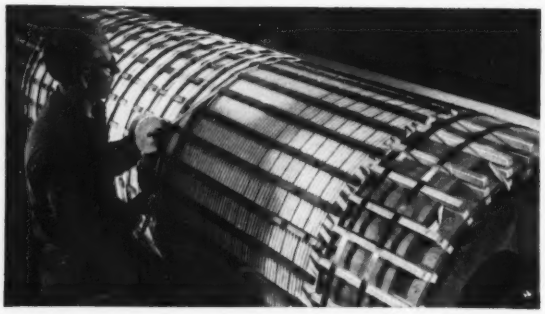
360-kv transformer proved "concentric layer" can take it. This 10,000-kva unit is, to our knowledge, the only power transformer in the United States ever to pass impulse tests at 1550 kv full wave and 1785 kv chopped wave.

GENERAL ELECTRIC

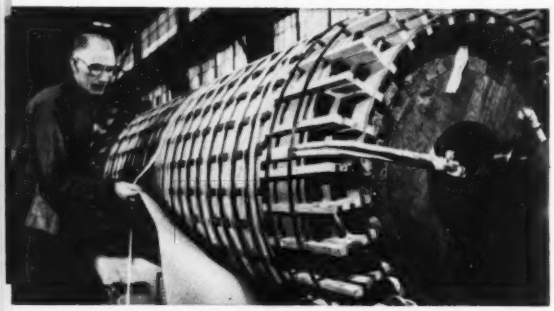
How G.E. builds "Concentric Layer" windings



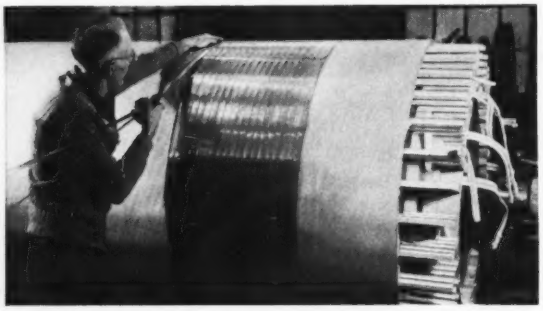
FIRST LAYER of conductor is wound on laminated paper cylinder. Friction ring holds coil tight during winding. Each layer is clamped tightly while succeeding layers are wound.



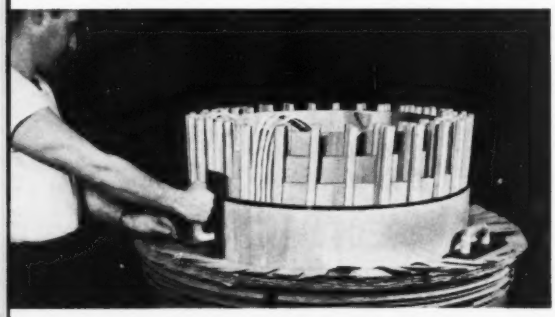
TIE STRIPS assure alignment of axial spacers and promote turbulence in oil flow. Ducts formed by spacers permit oil to cool by direct contact with each conductor.



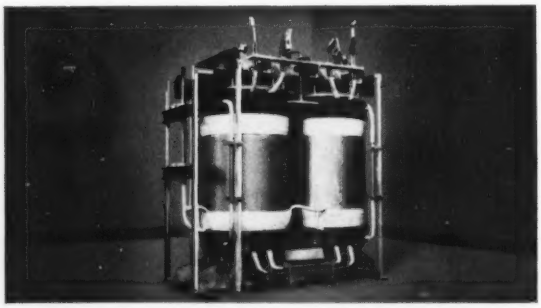
QUALITY KRAFT PAPER of high dielectric strength is wound over spacers to form the cylindrical insulation used between layers of conductor.



LINE SHIELD applied outside last conducting layer completes shielding of coil. Final "cylinder" of insulation will cover this shield to complete the winding.



ENDS OF PAPER insulating layers are flanged over to improve dielectric characteristics. As flanging progresses, wooden spacers are removed.



ASSEMBLED CORE AND COILS for a typical General Electric single-phase "concentric layer" power transformer viewed from the low-voltage side.

401-23

GENERAL ELECTRIC

A Statement by Anaconda on the Copper Situation

MANY users of copper have vital decisions to make . . . usually in connection with the present defense-induced shortages of copper and aluminum. This statement is an effort to remove the smoke screen surrounding the copper picture . . . to wipe away the confusion caused by too much talk supported by too few facts.

Substitution poses problems – Industry has been urged to substitute aluminum and other materials for copper. In some instances this may be logical and practicable. In many others it is difficult, if not impossible. But – before making *any* long-term decisions that may cost a great deal of money in engineering, new plant facilities or rescheduling of production operations – one should know the facts about the future of copper.

New Anaconda projects – The first major increase in copper production will come from Anaconda when the Greater Butte Project and the new Sulphide Plant at Chuquicamata, Chile, begin operations this spring. By 1953, these two projects should raise present levels of copper production by about 95,000 tons yearly.

Toward the close of 1953, Anaconda's new Yerington project in Nevada is expected to start producing at an annual rate of 30,000 tons. By then, Anaconda will be adding to the present yearly copper supply at the rate of about 125,000 tons.

Other new projects – During 1954-55 still other new projects in the U. S. and friendly foreign countries will further augment the increasing copper supply. All told, it is estimated that by 1955, not less than 450,000 tons of copper could be produced annually – over and above present production levels.

Accordingly, in 1955-56, domestic production plus imports could bring the U. S. copper supply to 1,800,000 tons yearly. This would represent an increase of about 20% over present levels. Based on historical comparisons, and barring a large-scale shooting war, this amount of copper could support a Federal Reserve Board Index of Industrial Production of 270, an increase of 24% over the present, and 45% above the first half of 1950.

• • •

These are the 'things to come' in copper. On the basis of the facts there is no necessity for considering long-range substitution of other materials for the red metal.

52320A

ANACONDA
COPPER MINING COMPANY

The American Brass Company
Anaconda Wire & Cable Company
International Smelting and Refining Company
Andes Copper Mining Company
Chile Copper Company
Greene Cananea Copper Company

PRODUCERS OF: Copper, Zinc, Lead, Silver, Gold, Cadmium, Vanadium, Superphosphate, Manganese Ore, Ferromanganese.

MANUFACTURERS OF: Electrical Wires and Cables, Copper, Brass, Bronze and other Copper Alloys in such forms as Sheet, Plate, Tube, Pipe, Rod, Wire, Forgings, Stampings, Extrusions, Flexible Metal Hose and Tubing.

THE INDUSTRY'S FIRST STANDARDIZED "FAMILY"

of 5 KV Cutouts with interchangeable doors!

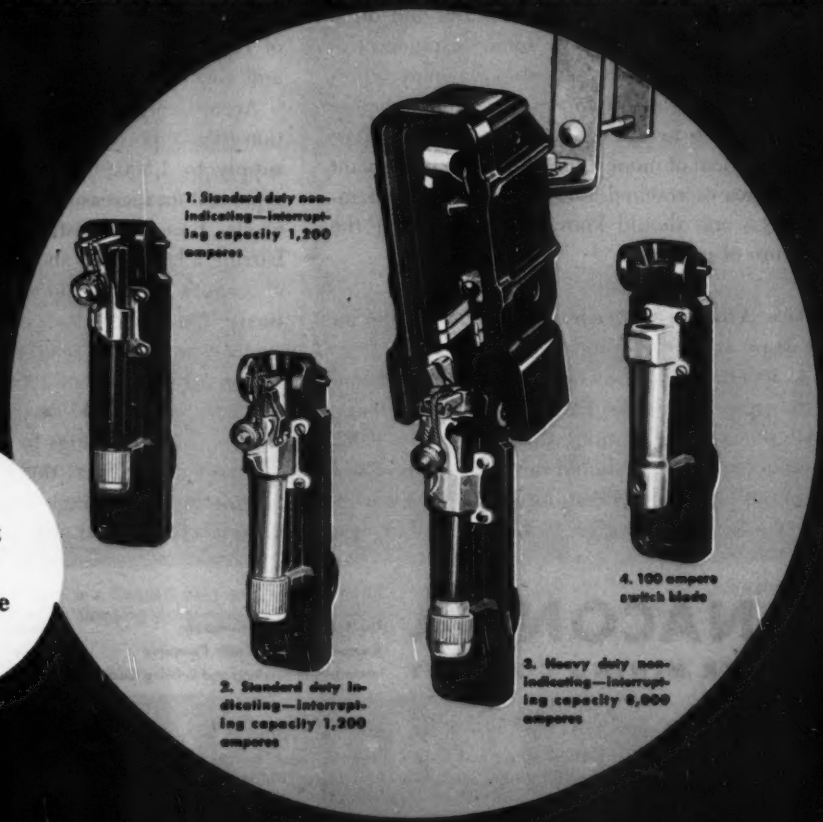
50 and 100 ampere cutouts, each with
new PND standard duty non-indicating doors
PVD standard duty indicating doors
PHD heavy duty non-indicating doors
100 and 200 ampere switch blade doors

L-M, leading manufacturer of distribution cutouts, presents the first fuse cutout family offering complete interchangeability. 50 and 100 ampere boxes are offered, each taking care of four types of services.

Now—buy one box, with the doors you need for your present services. As operating requirements change, simply unhook the present door and hook on a new one. It's a 6-second job!

This new family saves space, time, and money in warehousing, installation, and operation. Safer, too! The lineman can remove the door completely, re-fuse, and replace it, all with the *switch stick*. When door is open, all door parts are dead.

Get the Whole Story. Ask the L-M Field Engineer; or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).


1. Standard duty non-indicating—interrupting capacity 1,200 amperes
2. Standard duty indicating—interrupting capacity 1,200 amperes
3. Heavy duty non-indicating—interrupting capacity 8,000 amperes
4. 100 ampere switch blade

50
ampere cutout with four interchangeable doors

L-M's New 5 kv "first family"

RATING	INTERCHANGEABLE DOORS AVAILABLE	INTERRUPTING CAPACITIES RMS AMPERES 2.5 kv	5 kv
50 AMPERES	1. "PND" standard duty, non-indicating	1,200 amperes	1,200 amperes
	2. "PVD" standard duty, indicating	1,200	1,200
	3. "PHD" heavy duty, non-indicating	8,000	5,000
	4. Switch Blade	100 amperes continuous current rating	
100 AMPERES	5. "PND" standard duty, non-indicating	3,000	3,000
	6. "PVD" standard duty, indicating	3,000	3,000
	7. "PHD" heavy duty, non-indicating	14,000	10,000
	8. Switch Blade	200 amperes continuous current rating	

"PVD," "PND," and "PHD" are L-M trademarks.

78

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LINE MATERIAL

fuse cutouts

Complete Coordinated Equipment for Distribution Today

Also in 7.5 kv sizes

A 7.5 kv family is also available, with 50 and 100 ampere cutouts, each with four interchangeable doors. Doors can be bought separately.

HIGHER PUNCTURE VOLTAGE VALUES WITH

VICTOR PURIFIED PORCELAIN

VICTOR NO. 900
SUSPENSION INSULATOR

Laboratory tests prove VICTOR *PURIFIED* PORCELAIN has 18% higher mechanical impact values, an improvement of 24% in the range of M & E strength values and oil puncture values that are remarkable (See charts at right!)

Secret of VICTOR *PURIFIED* PORCELAIN is the removal of mineral salts from water used in processing. Years of research in this field have reduced fluctuations in shrinkage and density and practically eliminated the formation of microscopic, glass-like impurities which, up to now, have prevented attainment of maximum strength and hardness. Result—the finest insulator porcelain ever made!

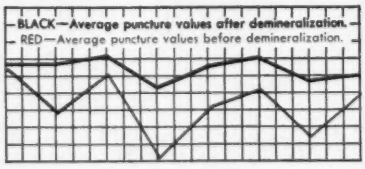
VICTOR INSULATORS, INC. • VICTOR, N. Y.

Specify VICTOR SUSPENSION INSULATORS

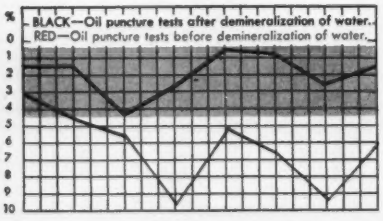
HERE'S PROOF!

Shown below are records of tests made on VICTOR 10" 15,000 lb. Suspension Insulators picked from production runs. These charts show test results of puncture under oil before and after demineralization of water. The first shows average puncture values of tests made and reveals a 7½% increase of average puncture values after water demineralization. The second shows percent average deviation of puncture values.

TEST RUNS OF PUNCTURE UNDER OIL



Average Puncture Values of Tests Run



Percent Average Deviation of Puncture Values

Facts from ALABAMA

"'CSP®' Transformers save $75.00 per pole on joint-use power line"

"$75.00 each per pole change. $4.00 each in cost of pole. $8.45 per transformer installed. These are the savings we obtained by using 'CSP' Transformers", says an Alabama Utility.

"Here's how we figured it:

"Ordinarily we use 35-foot poles on rural lines. While the Phone Co. was negotiating with us for joint use, we ran into a clearance problem. Conventional transformers would then require 40-foot heights. This meant new poles with change-out cost of approximately $75.00 each. However, 'CSP' Transformers afforded ample clearance on 35-foot poles, avoided the changing job, provided savings in pole cost on the proposed joint lines."

Also installation costs were reduced from $22.45 to $14.00 per transformer.

Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies developed the National Averages shown at left.

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Cost	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Lead Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet B-4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

"CSP" devices . . . originated and patented by Westinghouse

Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

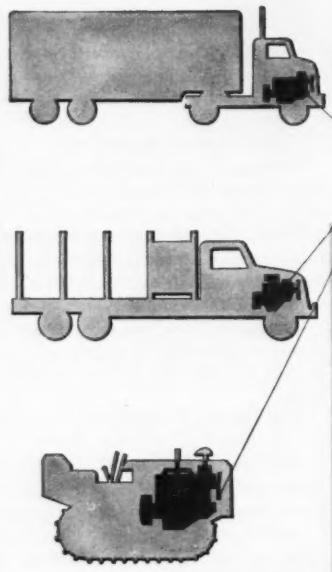
J-70598-A

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

TO CUT YOUR MAINTENANCE COSTS

ON HEAVY DUTY ENGINES

Use Shell Rotella Oil



Extra Heavy Duty for DIESEL and GASOLINE engines

What this oil does

Shell Rotella Oil is now recognized as an *extra* heavy duty oil. That's because it so greatly exceeds all the accepted performance requirements. It excels particularly in two: keeping critical engine parts *clean;* protecting against *wear.*

What this means to you in $ and ¢

Cleaner engines, reduced rates of wear—those mean a tremendous increase in engine *life.* And a drastic cut in maintenance costs. Yes, there's a real dollars-and-cents saving in Shell Rotella Oil. Get the full story from your Shell representative.

SHELL

Remember, only Shell offers you
SHELL ROTELLA OIL
the extra heavy duty oil that cuts engine maintenance costs

MR. A. D. IRION, ASSISTANT SUPERINTENDENT OF SHOP AND TEST DIVISION, USES EVALUATION FORMS TO EASILY DETERMINE BAR X AND SIGMA.

Southern California Edison Adopts Meter Accuracy Evaluation Method

I-50 CERTIFICATION MEANS that meters are factory-certified within these limits: Bar X within ±0.1% and Sigma within 0.15% on full load and 0.20% on light load. Also, 99.9% free from defects that might cause improper registration or operation.

Southern California Edison Company, which has recently installed its one millionth meter, is now using the Bar X (average accuracy) and Sigma (accuracy distribution) method of evaluating the accuracy of groups of meters. According to Mr. F. A. Redding, Superintendent of Edison's Shop and Test Division, this method has proven highly satisfactory.

REPORTS A.D. IRION, "The Bar X and Sigma method not only is a valuable tool to the meter engineer but also is an indirect method of checking the standards used in meter testing. Comparison of evaluation data from time to time provides a simple means of analyzing accuracies which can only be made by other long and tedious obsolete methods. Computations can readily be made on groups of meters in a minimum amount of time."

FOR COMPLETE INFORMATION, call your G-E representative or write for bulletin GED-1408; Section 601-82, General Electric Company, Schenectady 5, New York.

SEND TODAY FOR COMPLETE SET OF METER EVALUATION FORMS

Section 601-82
General Electric Co.
Schenectady 5, N. Y.

Please send me a set of evaluation forms (GEZ-332) ☐
plus a descriptive brochure (GED-1408). ☐

NAME _____ POSITION _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

"More Power to You".®

through GENERAL CABLE experience and know-how in the manufacture and application of...

ALEC

GENERAL CABLE GENERAL CABLE GENERAL CABLE

PIONEERS IN ALU

TRAL

WIRES and CABLES

Twenty years ago, ALECTRAL pioneered the use of aluminum as a conductor for all purposes. The name was assigned to wires and cables of high tensile strength *aluminum*, engineered as solid or stranded conductors for transmission and distribution service.

Today General Cable can supply all types of ALECTRAL, including ALECTRAL-ACSR (bare and weatherproof), ALECTRAL Weatherproof ("O.K.", "Peerless", "Tip-Top" and Polyethylene covered) and ALECTRAL Insulated Service Drop and Entrance Cables.

General Cable manufacturing and field experience with aluminum conductors well qualifies our engineers to offer intelligent and practical counsel to the many who are planning to use aluminum conductor cables on current or future projects.

GENERAL CABLE
CORPORATION

EXECUTIVE OFFICES: 420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

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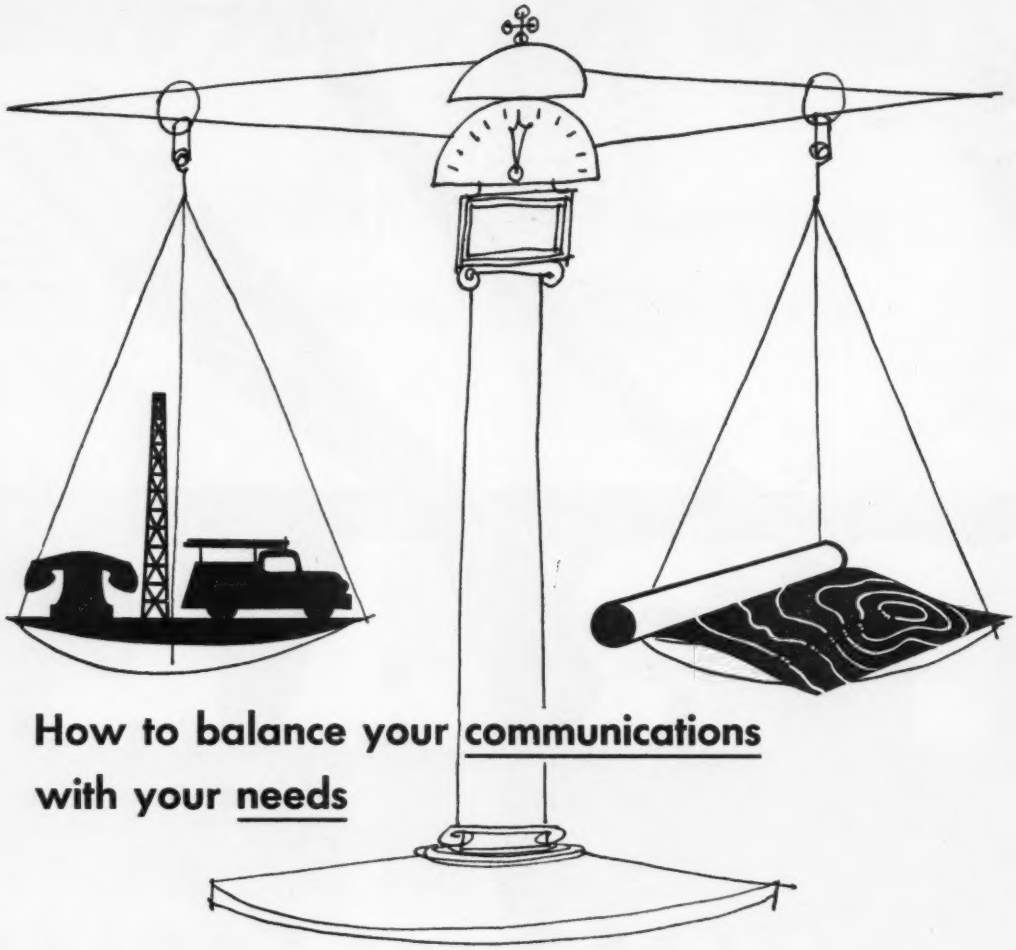

How to balance your communications with your needs

Every power line has its own individual communications requirement. Any less is unsatisfactory. Any more is wasteful.

The Bell System can provide exact amounts of communications service—*no less*, and *no more* than you should have. If your communications needs increase, we can expand your service accordingly. If your needs decrease, we can trim your service to fit.

Net result: *good*, *flexible*, efficient communications for the job at all times.

The Bell System places all forms of communications at your service—using microwave radio, wire or cable. In every case, we have matchless experience to back up our equipment.

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Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

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BELL TELEPHONE SYSTEM

Reliable Operation and Constant Timing ... from Mechanically Stored Energy

115- to 230-kv
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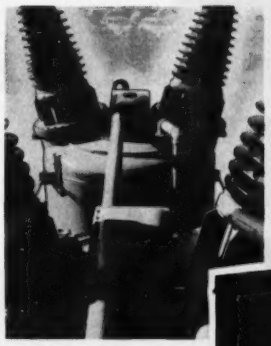
(Also other styles, 7.5 kv and up)

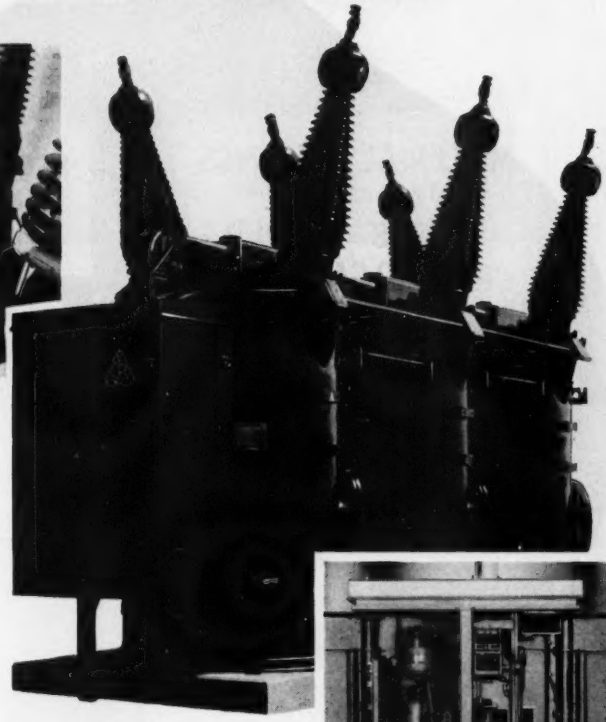
PACIFIC ELECTRIC Type RHE

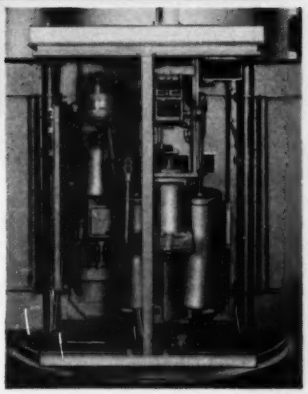
HIGH-SPEED RECLOSING

CIRCUIT BREAKERS

to 10,000,000 Interrupting kva (at 230 kv)







RIGHT: View of Tank Tops, looking toward Tank No. 1, showing housings for opening springs and tube containing pull rod.

CENTER: Type RHE in TEXAS (138 kv).

FAR RIGHT: Interior of Mechanism Cabinet, showing both closing-spring barrels and motor-operated oil-hydraulic jack for spring compression.

THE MOTOR-Compressed operating springs of the PACIFIC Type RHE oil circuit breaker stand ready for action for years, if necessary, without anything meanwhile having to move or operate.

Directly connected to the crank arm of the blade unit in each tank is a set of external opening springs. In the end-mounted mechanism cabinet are the closing springs which act upon the pole units through a pull rod that is compensated for unequal stretch in its sections. Simultaneous operation is thereby assured at all poles.

Energy is stored in the closing springs by means of a motor-operated oil-hydraulic jack. Oil is under pressure only during the ten-second interval required for compression of the springs.

These features insure reliability of operation as well as constant closing time under all conditions . . . of special benefit when synchronizing.

Write for Catalog 585

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Since 1906

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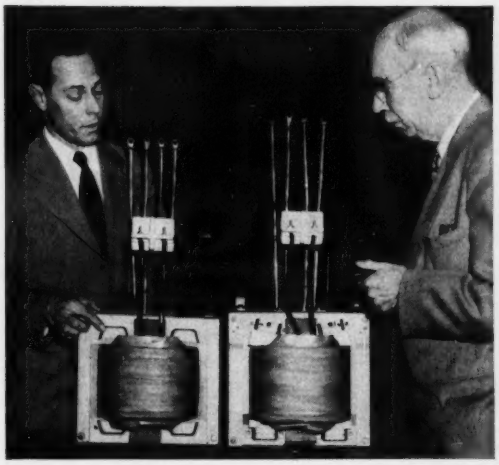
Now...new design makes G-E pole-type

LESS WEIGHT ON POLE. C. E. Sutton, Jr., Manager of Distribution Transformer Sales, points out material which will *not* have to be hung on pole, thanks to new design.

transformers even lighter, stronger



STRONGER, THOUGH LIGHTER INTERIORS result from improved clamping structures and coil supports. N. M. Case, Section Engineer, and E. D. Treanor, Manager Distribution Transformer Engineering, examine simple two-channel clamp with welded cross braces which replaces four-angle structure with bolted cross braces on unit at right.

WHAT FOUR WEIGHT REDUCTIONS HAVE MEANT. Unit on left is a pre-Spirakore distribution transformer. It weighs 505 pounds. It has an over-all height of 39 inches. Projected floor space is 21 by 22 inches. Comparable Spirakore unit on right weighs 335 pounds. Its over-all height is 35 inches. Projected floor space is 18½ by 20¾ inches.

Low losses retained — regulation improved — as Spirakore* transformer design chalks up fourth weight reduction

General Electric has again made important improvements in the quality of its core steel and its processing methods, permitting the redesign of most of its pole-type distribution transformers. The resulting copper savings are enough to build seven transformers where we could previously build only six.

Substantial weight reduction. The new units retain the low losses and high thermal capacity to take overloads, characteristic of previous designs. They also offer lower impedances, resulting in improved regulation. Physically, they're stronger than previous designs. Yet, they weigh substantially less:

AVERAGE REDUCTION IN MATERIALS WITH THE NEW DESIGN
(5000 volts and below)

- **10% reduction in total weight**
- **16% reduction in copper**
- **9% reduction in oil**
- **3% reduction in steel**

On a 2400-volt, 37½-kva unit the weight reduction amounts to 100 pounds. This means enough copper is saved to build a new-design 5-kva unit and enough oil for a new-design 10-kva unit.

Greater Short-circuit Strength. In the new design, clamping structures and coil supports have been simplified. . . strengthened. Support structures stay tight throughout treatment and life of the transformer. Tight coil supports prevent slippage between high- and low-voltage coils—increase short-circuit strength materially.

Continued leadership. The new design represents another of the many improvements that have helped maintain Spirakore transformer leadership since 1937. High impulse strength, Nitrile rubber gasket sealing, and long-life Melaglyp paint finish are some of the reasons why Spirakore transformers give extra years of service.

For complete information on these units write for GEA-4885, *General Electric Co., Schenectady 5, N. Y.*

*Registered trade-mark of the General Electric Co.

Spirakore transformers give extra years of service.

402-118

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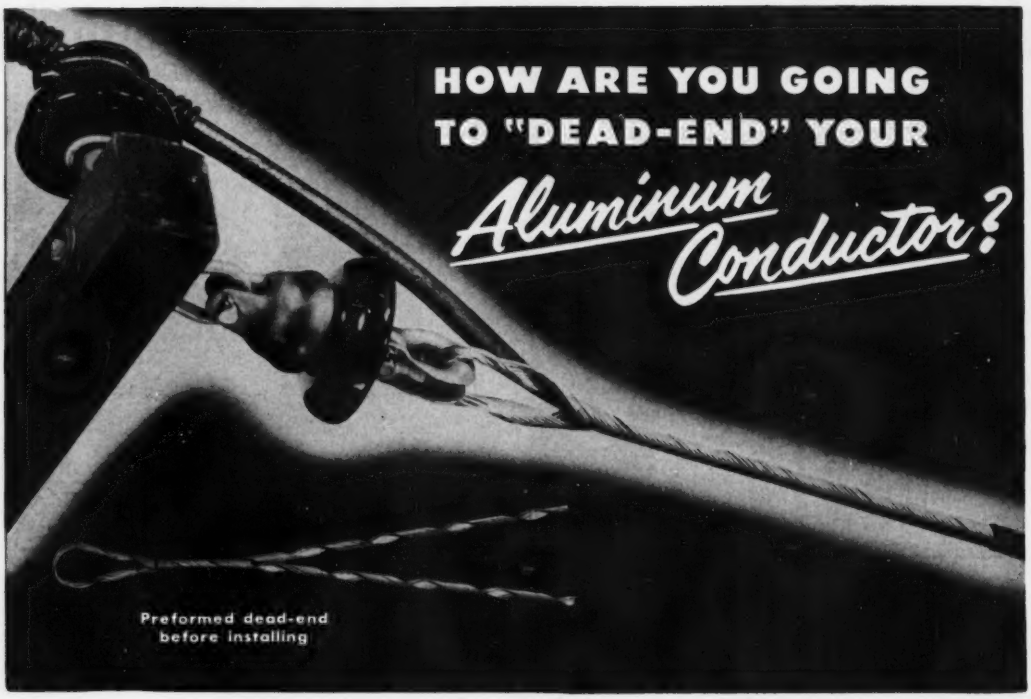
With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



"Regarding the future, copper just will not be available. If you want to string lines, install buses, or run loops, it will pay you to investigate every possible use for aluminum wire—covered and bare."*

BUT DEAD-ENDING ALUMINUM CONDUCTORS EFFICIENTLY AND ECONOMICALLY TO ASSURE MAXIMUM LIFE REQUIRES A NEW TYPE OF DEAD-END.

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For the details of its exclusive advantages write on your letterhead or . . .

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*From the remarks made by a spokesman of Defense Electric Power Administration before the Transmission and Distribution Committee of Edison Electric Institute at a recent meeting.

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Quality is a set of characteristics that go well beyond the surface. For KILLARK, it literally means "clear-through" dependability: Solid Alumalloy construction for a lifetime of corrosion-proof service with satin-smooth finish for attractive appearance.

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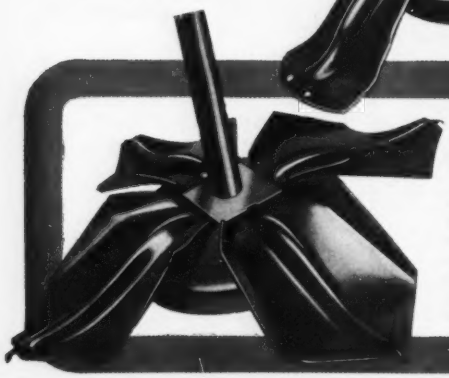
(8" DIA.)
Three sizes—with nominal holding power classifications from 6000 pounds to 10,000 pounds.



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(10" dia.—effective area expanded, 200 square inches.)
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ELECTRICAL BOOKS

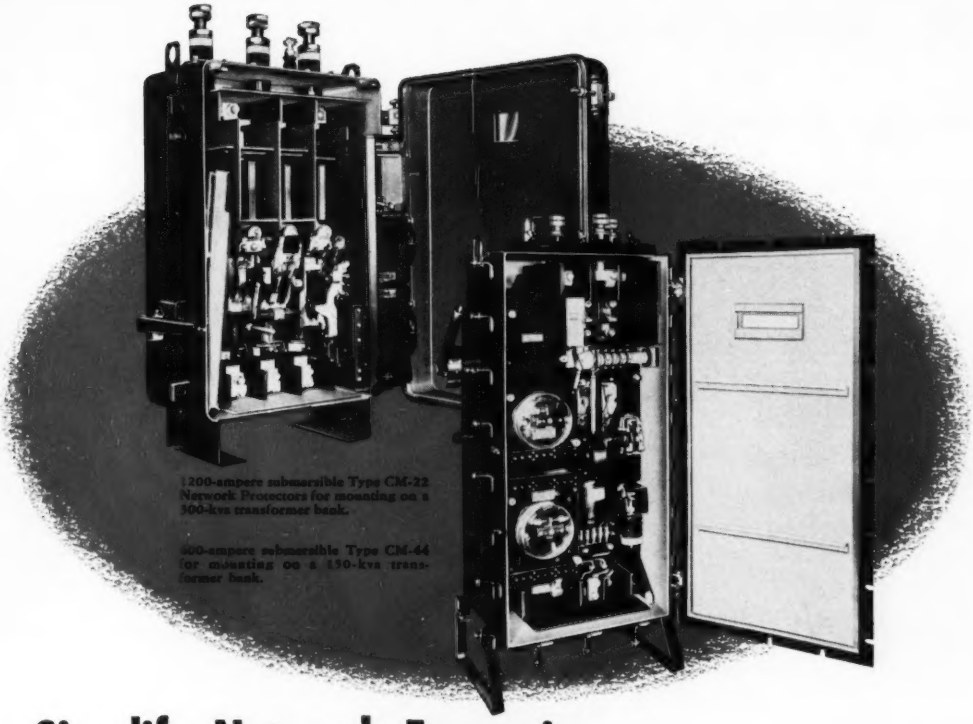
GENERATING STATIONS, by Alfred H. Lovell, 431 pages, 6x9, fourth edition, McGraw-Hill Book Co. Inc., $6.50. Designed for student engineers, this text emphasizes the interrelation of mechanical and electrical elements in power plant design and associated transmissions. Financial aspects of power generation and supply and the economic viewpoint throughout the text show the demands of the utility industry. Material on utility financial operations, investments, interest, depreciation, etc., has been revised. New sections cover the gas turbine, advanced designs in circuit breakers and relays, and generating-station auxiliaries. Illustrations, problems and references are included.

EQUIVALENT CIRCUITS of ELECTRIC MACHINERY, by Gabriel Kron, 278 pages, 6x9, John Wiley & Sons Inc., $10. Features of this book are: Development of the theory of equivalent circuits without the aid of mathematics; the equivalent circuit of the primitive machine is developed and followed through for industrial machines; the calculation of performance of interconnected machines; equivalent circuits for transient and accelerating equations of performance of any machine or group of machines, and their steady-state equations; to establish the transient or sinusoidal transfer functions of groups of rotating machines used in servomechanisms and system controls; transient equations derived from circuits correspond to those derived from the use of the equations of Lagrange and Maxwell.

TENSOR ANALYSIS: THEORY and APPLICATION, by I. S. Sokolnikoff, 335 pages, 6x9, John Wiley & Sons Inc., $6. After development of the tensor theory, it is applied to geometry, mechanics, relativity, elasticity and fluid dynamics. The first chapter discusses linear transformations and matrices, stressing the geometry and physics of the situation; succeeding chapters contain algebra and calculus of tensors; geometric topics in the study of analytical dynamics; relativistic mechanics; and the formulation of essential ideas of nonlinear mechanics of continuous media in the general tensor form.

ALCOA: AN AMERICAN ENTERPRISE, by Charles C. Carr, 292 pages, 6x9, Rinehart & Co. Inc., $3.50. The story of an American enterprise from its pioneering mill-plant days in the late '80's to the present, and how the perseverance of Charles Martin Hall and his associates resulted in the development of aluminum and the foundation of the aluminum industry.

GENERAL NETWORK ANALYSIS, by Wilbur R. LePage and Samuel Seely, 516 pages, 6x9, McGraw-Hill Book Co. Inc., $8. A text designed to lay the foundation for phases of network analysis, including background for network synthesis. It covers lumped and distributed networks in the steady state and lumped networks in the transient state. Exercise problems of imaginative and drill type accompany each chapter.



1200-ampere submersible Type CM-22 Network Protectors for mounting on a 500-kva transformer bank.

800-ampere submersible Type CM-44 for mounting on a 150-kva transformer bank.

Simplify Network Expansion with Westinghouse NETWORK PROTECTORS

You can expand your network system simply—and economically—with Westinghouse Network Protectors. The reason—Westinghouse heavy-duty and medium-duty protector use the same relays. Hence, as load grows medium-duty (CM-44) protectors can be replaced with heavy-duty (CM-22) protectors and suitable transformers—*without upsetting system co-ordination!* CM-44 units may then be moved to lighter load areas.

Keep this important Westinghouse feature in mind as YOU plan your network system. It's a *sure* way to provide for simple, low-cost expansion of that system when load conditions dictate.

Ask your Westinghouse representative for further information . . . or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. J-60778

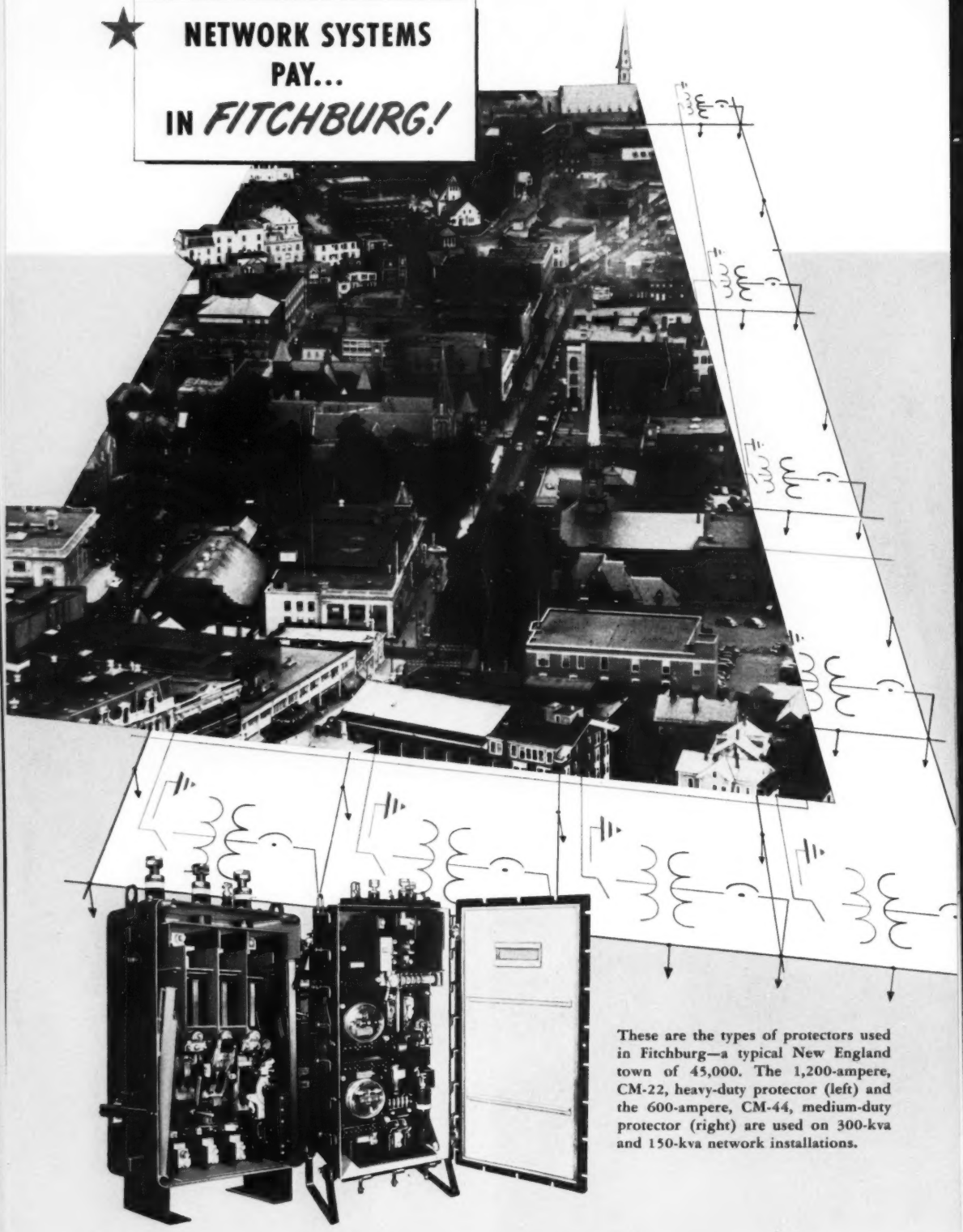
ONLY WESTINGHOUSE NETWORK RELAYS . . .

- Eliminate gears that cause friction and wear.
- Have a sensitive reverse-current setting that can be varied from .1% to 10% of the network protector rating.
- Have bearing surfaces readily accessible for inspection and cleaning.
- Have relay terminal screws that eliminate the need for additional testing facilities in the control wiring.
- Provide a nonsensitive relay that permits sensitive tripping after a time-delay.

YOU CAN BE SURE . . . IF IT'S Westinghouse

NETWORK PROTECTORS

NETWORK SYSTEMS PAY... IN *FITCHBURG!*



These are the types of protectors used in Fitchburg—a typical New England town of 45,000. The 1,200-ampere, CM-22, heavy-duty protector (left) and the 600-ampere, CM-44, medium-duty protector (right) are used on 300-kva and 150-kva network installations.

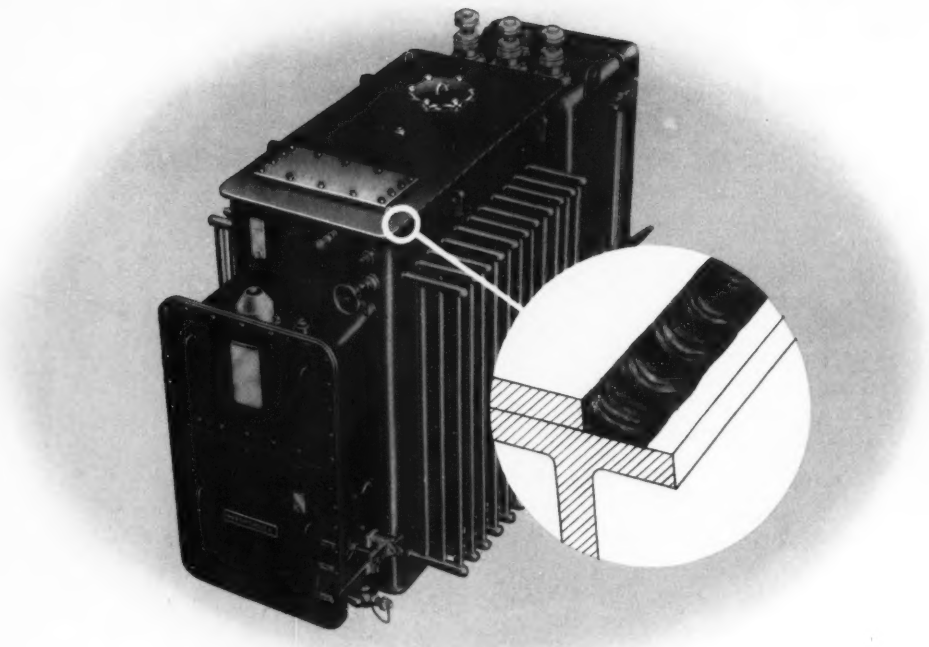
See how much new capacity they got without uprooting their system!

Fitchburg, Massachusetts, in 1943 was in the same predicament as many small and medium-sized cities . . . it was faced with a rapidly growing load problem. Business and industry were expanding under the stress of World War II, causing subsequent voltage-regulation and service-continuity problems. The Fitchburg Gas & Electric Company then was operating close to its installed capacity of 1,400 kva for the downtown area, served by twenty-eight 50-kva subway transformers.

THE SELECTION OF AN A-C SECONDARY NETWORK SYSTEM proved to be the ideal solution for two important reasons. First, it utilized existing feeders with a minimum new-equipment investment. Best of all, it provided a flexible long-range solution that enabled the utility to handle a load growth of 35% and still be ready to accommodate future load growth.

THIS STORY IS BEING REPEATED ALL OVER THE U. S. A. . . . for 35% of all secondary networks are installed in towns ranging from 3,500 to 45,000 population. Main Street is loading up everywhere; and commercial areas . . . regardless of load density . . . require the complete reliability of an A-C Secondary Network System.

FIRST COST OF A NETWORK SYSTEM is a factor, but it's still generally lower than that of any other distribution system providing comparable service. Its long-range cost is definitely lower because of greater flexibility, reduced operating and maintenance costs. Layouts are simplified. Extensions, load shifts, and future changes are more easily and economically handled. In short . . . your city is ready for growth . . . that "pays off"! For the full A-C Secondary Network System story, call your nearby Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-97156



NO COVER BOLTS! NO GASKET!

Another Maintenance Problem Reduced!

It's a major maintenance problem when oil sludges and insulation oxidizes.

Leakage of air and moisture is most likely to occur through the main cover gasket. That's why Westinghouse recommends welded-on covers for network transformers. Leaks are prevented ... uncontrolled breathing eliminated.

It is still necessary, however, to gasket some switch and terminal chamber covers, bushings, oil gauges and handhole covers. Cortite* gaskets, composed of cork particles individually surrounded and bonded in special synthetic material, have been developed for this purpose. They provide a long-lasting, seepage-proof seal.

These two features, welded-on covers and improved gasketing for small openings, serve to greatly iessen the possibility of oil sludging and oxidation of insulation.

Removal and replacement of welded covers, if necessary, is easier and quicker than the gasket-and-bolt technique. For proof, ask your Westinghouse representative to arrange a showing of the ten-minute movie, "Welded-on". All operating and maintenance supervisors should see it. Phone today or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE...IF IT'S

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NETWORK TRANSFORMERS

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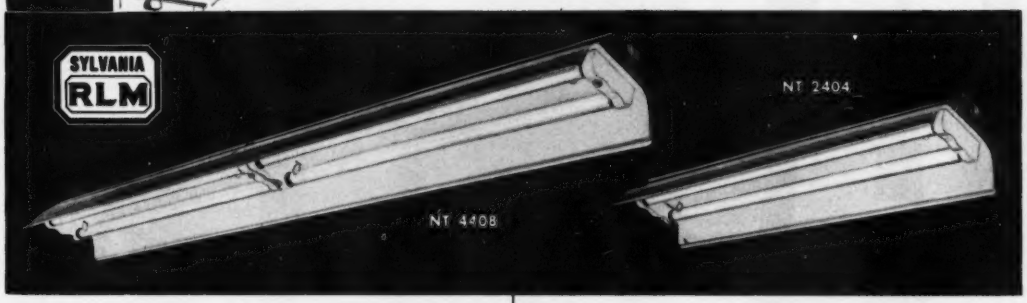

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2 222 New Industrial Fixtures.

Adaptable to the full range of industrial lighting . . . from simple store-room illumination to high intensity lighting required in inspection and precision assembly operations.

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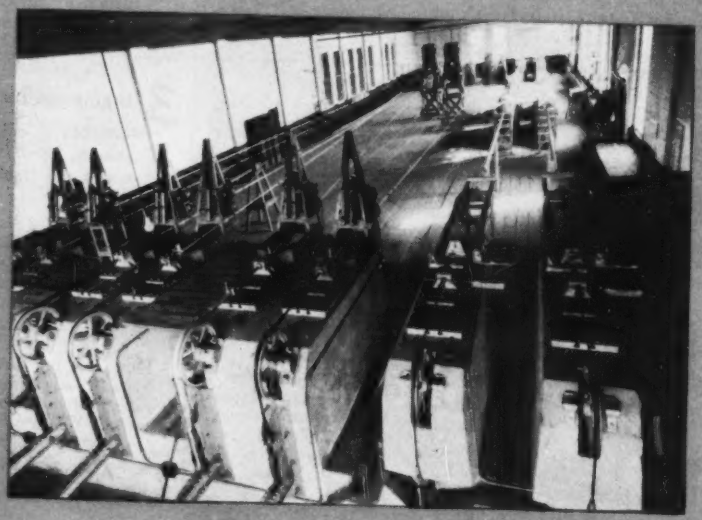

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Here, vibration machines give a cable the shakes, for months and months. From research like this, Alcoa has devised ways to dampen vibration . . . to add years and years to the life of transmission line conductors.

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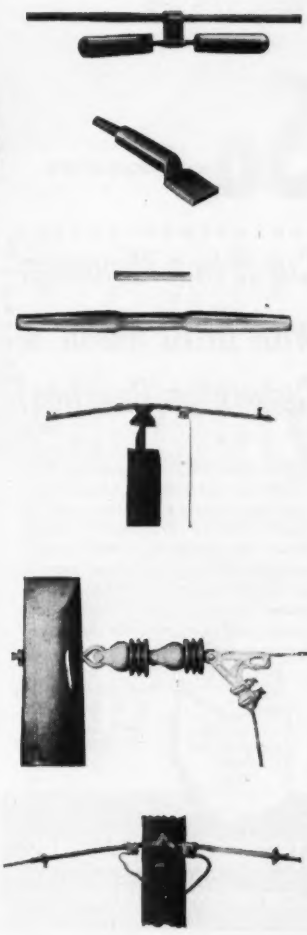

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LETTERS TO THE EDITOR

Farm Electrification In California

To the Editor:

In looking through the February issue of ELECTRICAL WEST, I note on page 92 your tabulation of farm electrification by states, and in this tabulation California is shown as 92.1% electrified.

I am certain that in the minds of most people, when we use the expression "electrified farms," they are thinking of farms on which people live. I am certain that was the thought in the minds of the government when the Rural Electrification Program was started and that the objective was to bring electric service to the people who live on the unelectrified farms of America.

If this is the basic meaning of rural electrification, then I wish to draw your attention to the figures recently compiled by the Edison Electric Institute under date of April 1, 1950, which were obviously compiled from the national census on this subject. This tabulation furnishes the following data for California:

Total number of occupied farms in California	121,697
Total number of farms using electricity	123,390

If these figures are correct (and I have no reason to doubt their accuracy) then the percentage of electrified farms in California, based upon occupancy, is now in excess of 100%.

I feel that this fact should be given a great deal more publicity than it is being given, for your figures show California still lagging behind in rural electrification.

R. C. MCFADDEN
Vice-President
Southern California Edison Co.
Los Angeles, Calif.

All the strength and durability inherent in steel are combined—with definite economies— in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

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Use this coupon if: (1) you have a problem; (2) want to ask a question; (3) want to comment on any department in the magazine; (4) have a "gripe."

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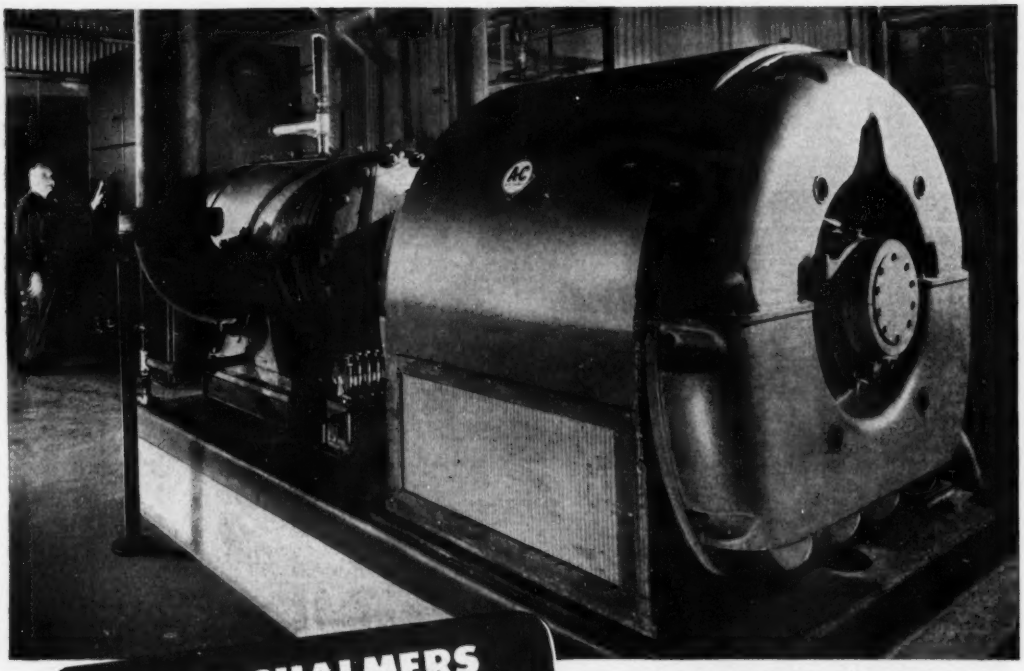


All Allis-Chalmers installation: 250-hp, 495-rpm, drip-proof cage motor; single-stage rotary compressor; controller.

ALLIS-CHALMERS Large Motors ... Provide Low-Maintenance Reliability

START with construction features that have already earned a reputation for ruggedness and reliability. Add all-around drip-proof and mechanical protection. And do this without sacrificing accessibility for routine maintenance.

That's how Allis-Chalmers large cage motors were redesigned. That's why you'll want these advantages in your new motors:

IMPORTANT FEATURES

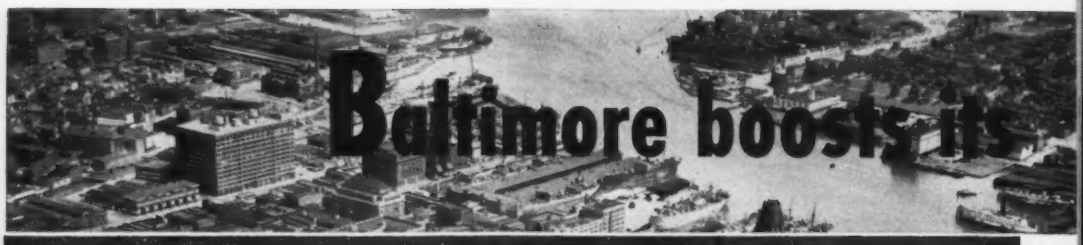
- Rigid cast-iron end shields assure you of correct bearing alignment and corrosion resistance as well as drip-proof protection.
- Capsule-type bearing housings enable you to leave the bearings and oil supply sealed against abrasive dirt when you remove the top halves of the end shields to clean the windings.
- Large air discharge openings in the yoke invite you to keep the ample passages back of the stator core clean and unobstructed. They also make installation easier.
- Louvers on air discharges and design of intakes keep foreign objects out of the motor.

A-3561

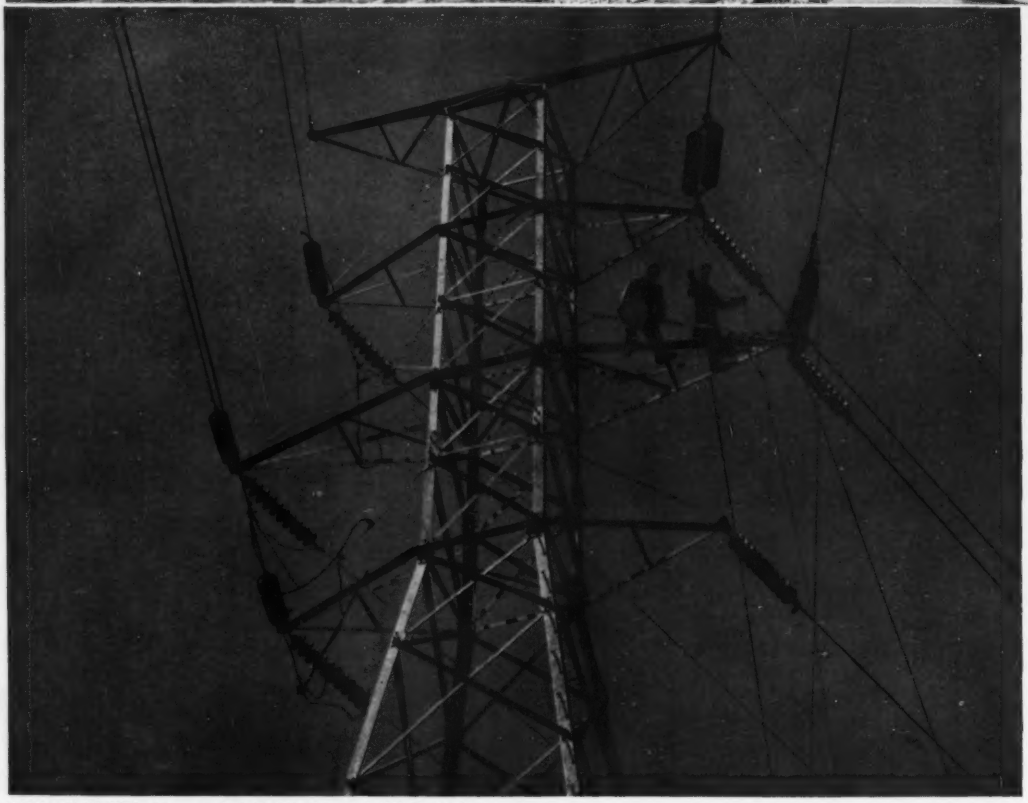
NEW BULLETIN

Built in ratings from 60 hp at 300 rpm to 1750 hp at 1800 rpm, these cage motors are described in detail in bulletin 0587342A. Ask your nearby Allis-Chalmers representative for a copy, and see for yourself why these redesigned motors provide a new low in maintenance and a new high in reliability. Allis-Chalmers, Milwaukee 1, Wisconsin.

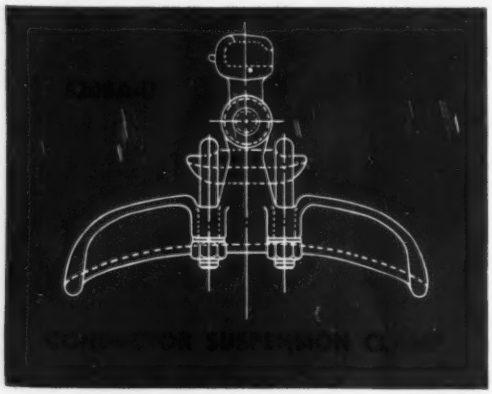
ALLIS-CHALMERS



Baltimore boosts its



MEN AT WORK Linemen install 556,500 cm ACSR conductors in place of 2/0 copper transmission conductors on this two-circuit tower.

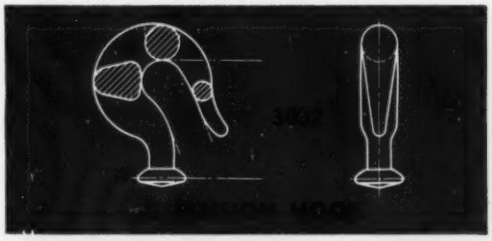


IN THE SPRING OF 1950, the Consolidated Gas Electric Light and Power Company of Baltimore began rebuilding its 110 kv ring system. This project was undertaken because studies of future load growth and planned generating facilities indicated the need for greater transmission line capacity.

THE COMPANY'S RING SYSTEM extends some 58 miles around the City of Baltimore, connecting generating stations at Westport and Riverside. Transmission conductors for the most part were 2/0 copper, with the remainder generally consisting of 4/0 copper. The Consolidated Gas Electric Light and Power Company's project called for replacement of these conductors with 556,500 cm ACSR on approximately 46 miles of line.

THE PROJECT INCLUDED the building of some 16.4 miles of additional line on right-of-way adjoining existing transmission lines. At several locations in this

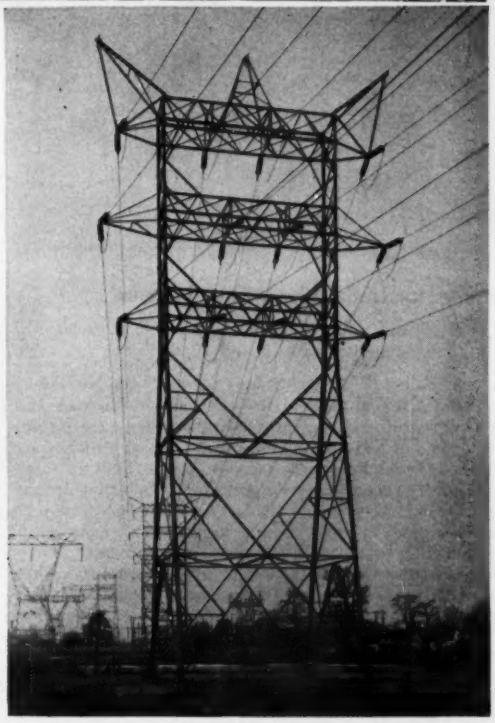
section, right-of-way limitations required the replacement of two-circuit transmission towers with four-circuit towers. This was accomplished under limited outage conditions by erecting temporary wood pole bypass lines which were operated while the two-circuit towers were replaced with the new four-circuit towers. In another section of the ring system, approximately 23.3 miles of transmission line including towers and conductors were replaced with heavier towers and ACSR conductors on the existing right-of-way. This was accomplished by installing new towers with split crossarms, after which the old towers were pulled over instead of unbolting and disassembling them.



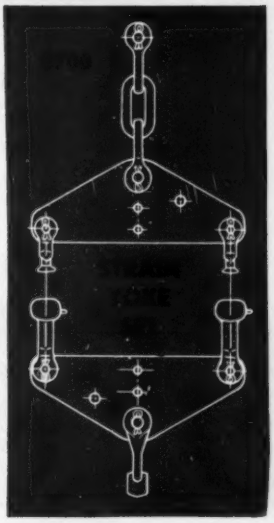
WITH THE WORK IN PROGRESS during high peak load periods and during the summer storm season, other special methods were devised to facilitate the completion of the project on schedule. In addition, transmission towers along 16.7 miles of line had to be reinforced to provide for the increased loading of the larger ACSR conductors.

Like so many major power concerns, Consolidated Gas Electric Light and Power Company of Baltimore used BTC Hi-Line Hardware on this project. Writes the company: "We have every reason to believe that its performance will be satisfactory." Specify BTC Drop Forged Clamps and Fittings for all your transmission line projects. You'll find they're easier to install . . . give trouble-free performance . . . and help hold maintenance to a minimum.

Sold through your insulator manufacturer only



PROJECT COMPLETED New four-circuit transmission towers like this replace two-circuit towers in several locations along Consolidated Gas Electric Light and Power Company's newly rebuilt 110 kv ring system.



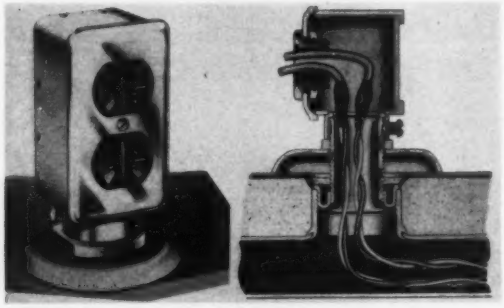
Drop Forged BTC *Hi-Line Hardware*

The **BREWER-TITCHENER**

Corporation

Cortland • New York

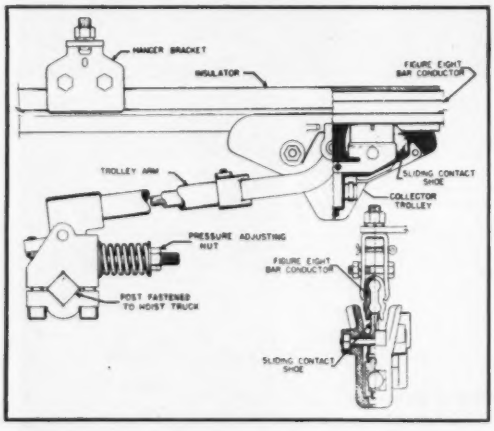
PRODUCT NEWS



Fittings for Underfloor Wiring Systems

(1) National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

A revised line of service fittings for use with Nepcoduct underfloor wiring systems features easy installation and increased wiring space. All locking facilities are outside the fitting. A self-locking set screw, applied through the collar, locks the housing to the 1-in. nipple. This set screw is handled from the outside and locks the fitting in any position. The fittings are made of heavy-gage steel with galvanized undercoating; come in vertical and horizontal positioned housings; are equipped with standard devices for high-potential light, power or office appliance wiring, or with bushed opening for telephone wiring and with connector block or buzzacall mounted inside on application.



Trolley System for Bare Figure-8-Bar Conductors

(2) Benbow Mfg. Co., 1285 Rollins Road, Burlingame, Calif.

A trolley system that insulates bare figure-8-bar conductors is claimed to combine low cost and high safety factor. Trade-marked Insul-8-Bar, the system can be applied to existing figure-8-bar conductors without dismantling or can be installed as a completely new system.

Basically the system consists of two units: a sheath of insulation material, cut to any desired length, that snaps over the 8-bar conductor and a sliding shoe collector, held against the insulated 8-bar conductor by spring action, adjustable from 2 to 10 lb pressure. The sliding shoe makes contact with the conductor through a continuous, narrow opening at the bottom of the insulation sheath.

The manufacturer claims that one man can insulate 100 ft of 8-bar conductor in less than ten minutes. Insul-8-Bar is adapted to curves, switches and crossovers. The present system, rated to 60 amp, is designed for standard 1-in. figure-8-bar conductors. Larger and smaller amperage versions will be available soon, it is reported.

Tubing Features Flexibility, Heat Endurance

(3) Irvington Varnish & Insulator Co., Irvington 11, N. J.

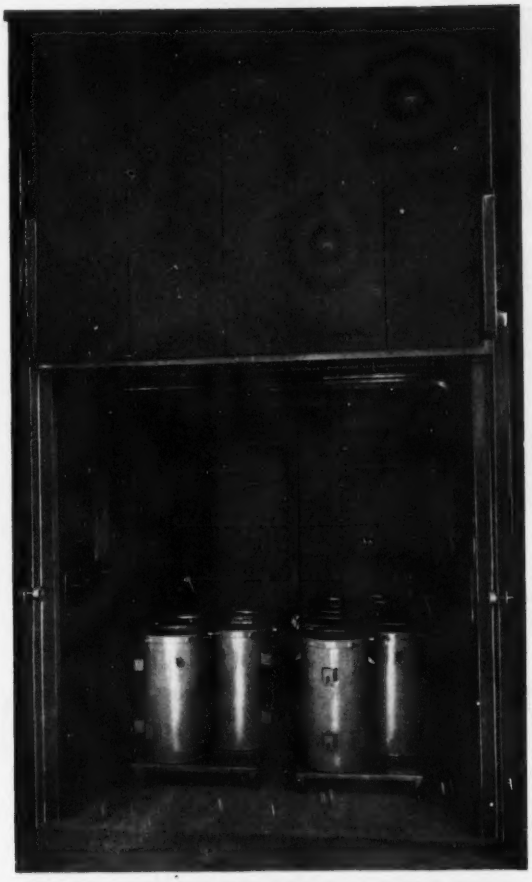
This new-type electrical tubing, claimed to withstand 200 hours' exposure at 200 C without embrittlement, is made of selected sizes of glass braid, coated with silicone rubber, using a special multiple-coat process to insure uniformity and roundness. It will meet the performance requirements of the government specification Mil-1-3190 on class H materials. A preliminary data sheet showing the minimum average voltage breakdowns at varying temperatures, lengths and sizes available is offered by the manufacturer's sales promotion department.

Flexible Fixture Fittings

(4) Russell & Stoll Co., Inc., 125 Barclay St., New York 7, N. Y.

Type CS explosion-proof swivel-type flexible lighting fixture fittings conform to the 1951 code and are Underwriters' approved for class 1, groups C and D. They are made of cast metals that can be selected for the conduit system. Swivel joint has swing angle of 30°, universal movement. Fitting is self-aligning, has no soft soldered joints. Length is 7⅜ in., width 2¾ in. Details in data sheet No. P83051-10.

AN OVEN TEN FEET HIGH



YOU could bake a tall cake in this all electric oven with pneumatically controlled vertical lift door, but that is not its function. This oven is used to bake enamel on *Gardner Transformer Tanks.*

There are cheaper ways to paint a tank, but *Gardner* uses this most expensive method because baked enamel affords maximum protection to the transformer.

This oven is an example of up-to-the-minute equipment which is used every day to give *Gardner Transformers* those extra refinements above and beyond the industrial requirements. That's why Gardner has the reputation for being—"custom built to exceed standard specifications."

Special problems are welcome. Our experience is widespread and our production line is flexible. Write for information.

GARDNER ELECTRIC MANUFACTURING COMPANY

FACTORY AND GENERAL OFFICE

4227 HOLLIS STREET EMERYVILLE (OAKLAND) 8, CALIFORNIA

Now a 32-step regulator for the

You can set new standards of service on your branch and rural circuits with this new ML32 single-phase step voltage regulator—*and at no extra cost!*

The ML32 supersedes the ML8 at no increase in price. With this new regulator, you get a twenty percent range of automatic voltage regulation—10% raise *and* 10% lower, in thirty-two 5/8% steps. You get *accurate* regulation, too—new Class I accuracy controls assure at least 99% accuracy, regardless of operating changes in temperature, frequency or load.

These and other new features make the ML32 by far the best and most advanced single-phase step voltage regulator available today. Booklet GEA-5752, just off the press, gives full information. Ask your local G-E sales representative for a copy, or write to *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

404-88

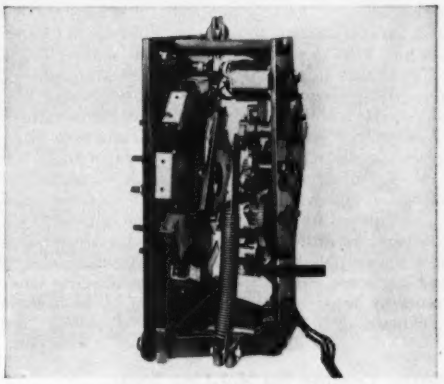
CLASS I CONTROL ACCURACY results from skilled craftsmanship and thorough testing. Here a composite test is being made of an assembled ML32 control panel. A final check is made on both the regulator and its controls after assembly.

MODERNIZED CONTROL PANEL is neat, simplified. All control knobs are conveniently located. A handy utility shelf holds meters and tools, and locks door in open position. In closed position, it may be used as an instruction book holder.

Standard Voltage Ratings

Kva Cont 55 C Rise	Cat. No.	List Price*	Load Amp at 10% Raise or Lower
RATED 2500 VOLTS (For 2500–2400-volt Circuits) (4330Y Volts)			
12.5	29D380	$1664	50
25	29D381	1885	100
37.5	29D382	2106	150
RATED 5000 VOLTS (For 5000–4800–4330–4160–2500–2400-volt Circuits) (8660Y Volts)			
25	29D385	$2193	50
50	29D386	2693	100
RATED 7620 VOLTS (For 12470GrY/7200–13800GrY/7960–11950GrY/6900–13200GrY/7620-volt Circuits)			
19.1	29D388	$2373	25
38.1	29D389	2820	50
57.2	29D390	3279	75
76.2	29D391	3715	100

For estimating purposes, multiply these prices by 0.52.

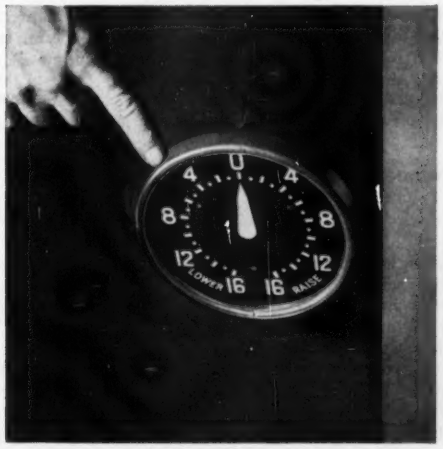


OPTIMUM-LIFE SWITCHING MECHANISM. Arrow points to new impeller that provides the optimum switching speed for maximum contact life. This improved switching design assures long contact life with fast, silent operation.

price of an 8-step!

the new ML32

- **10% raise and 10% lower in thirty-two 5/8% steps**
- **Class I Control Accuracy**
- **Modernized Control Panel**
- **Optimum-life Switching Mechanism**
- **Large Magnetic Position Indicator**



LARGE MAGNETIC POSITION INDICATOR on the new ML32 has big, bright numerals and is slanted downward for ease in reading from the ground.

Plastic Film for Insulation

(5) Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

Scotch brand PTF film is a plastic electrical insulating material for applications involving high temperatures, high frequencies and high voltages. It is made from Teflon by a process claimed to produce fewer air entrapments in the film than in previous material of its type. Two layers of 3-mil film form a continuous surface insuring positive dielectric protection at a 5,000 v level, the manufacturer states. The translucent film withstands temperatures from –100 to 500 F and meets both class B and class H requirements, permitting its use in class H capacitors.

It is nonflammable, will not track, resists all solvents except certain boiling chlorinated solutions, is unaffected by all types of impregnating varnishes and will not absorb moisture, according to the manufacturer. It resists cold flow under pressure, has a tensile strength of 7,800 psi and has some stretch with moderate winding tension. It comes in 36-yd rolls in widths from ¼ to 6 in. and in thicknesses of 3, 5, 10 and 15 mils.

Plastic Coating for Hot-Line Tools

(6) A. B. Chance Co., Centralia, Mo.

A tough, transparent plastic coating, called Maplac, recently introduced for this manufacturer's hot-line tools is claimed to protect the sticks and reduce maintenance. According to the announcement, the material is crystal clear to permit inspection of the wood; it retards moisture absorption; its electrical resistivity exceeds that of the wood it covers; if damaged, it can be repaired by the user without heat or special equipment.

Frequency Transmitter

(7) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A new-type MW low/medium-frequency transmitter for fixed-station operation for private and public communications services is designed to meet FCC requirements and is adaptable to facsimile and frequency-shift keying types of emission in addition to CW, MCW and phone.

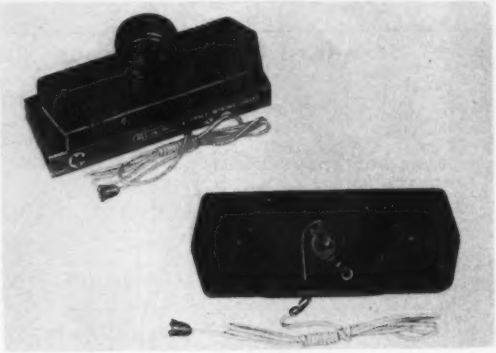
This equipment is said to be a new approach to the problem encountered in using large inductors and capacitors at the low frequencies. The conventional tank-type circuit, at these frequencies and at this power, requires components that are extremely large. Also multifrequency selection and operation when using conventional components require use of relays, motors or manual switches. The type MW transmitter uses iron core transformers at the low and medium frequencies. These units are small in size and eliminate necessity for tank-circuit tuning.

The unit is designed for operation over an ambient temperature range of from 0 to 50 C and for value of relative humidity up to 95%.

Plastic Motor Slot Wedge

(8) Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill.

The new Inmanco laminated plastic wedge meets all temperature requirements for class B insulation and is rotary cut molded to fit the exact contour of motor slots, according to the manufacturer's announcement These shaped-to-fit wedges are made from a felted or carded asbestos-base laminated plastic. Continuous heat resistance is 275 F; short-time heat resistance is 400 F. A variety of sizes can be made in eight standard styles or shapes.



(9) A nylon ratchet for pull-chain sockets and lampholders has been developed by Monowatt Department of General Electric Co., 95 Hathaway St., Providence, R. I., to replace metal ratchets. According to the manufacturer, high dielectric qualities of nylon eliminate possibility of electricity shorting through to pull chain

Continuity Tester

(10) Ideal Industries Inc., 1042 Park Ave., Sycamore, Ill.

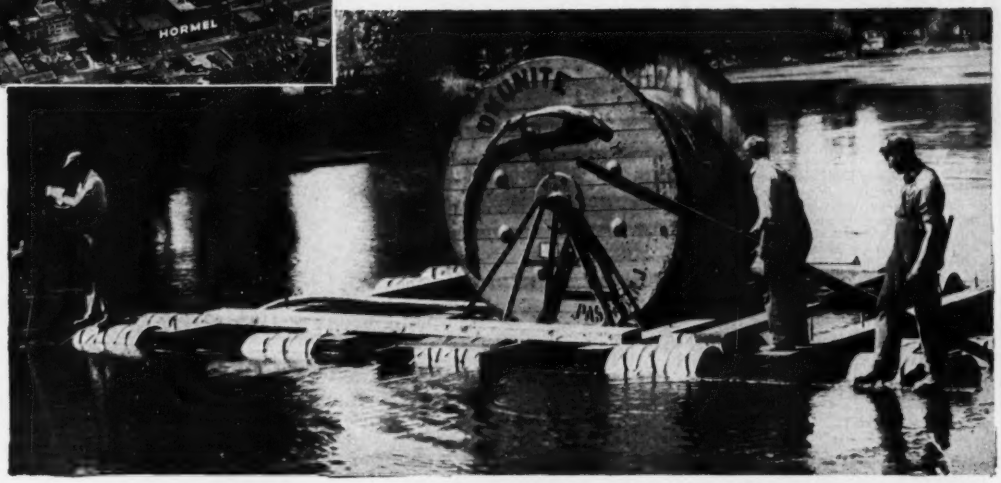
Designed to determine continuity of circuits and identify wires between terminals or in multiwire cable, this tester provides its own power from pen-lite batteries, eliminating need for live-wire connections. It may be used in noisy areas because it has a signal light indicator that illuminates the point of contact. It requires only one hand. Comes with 4-ft cord.

Duplex Table Tap

(11) John I. Paulding Inc., New Bedford, Mass.

This duplex table tap is molded from high-impact high-dielectric plastic; carries a rating of 15 amp at 125 v or 10 amp at 250 v. The twin outlets have bronze double-wiping contacts. The cover may be lifted off by removing a single screw. Connection is made to large-headed terminal screws and a slot is provided for the lead-in. The bottom base plate is made of die-cut insulating fiber reinforced with a zinc-plated steel strap. The tap comes in brown or ivory. Catalog number is 1422.

HORMEL Makes Sure



...with OKOLITE cables

Costly perishables depend on uninterrupted power transmission

At Hormel's plant in Austin, Minn.—home of famous "SPAM"—thousands of dollars worth of meat are constantly being processed. Any breakdown or stoppage of electrical service would cause a tremendous loss.

When Hormel enlarged its electrical requirements, engineers installed two 13.8 kv Okolite submarine cables to convey power from the municipal plant across the Red Cedar River to the Hormel switchboard. Cables were laid from a raft specially constructed to clear obstructions in the river.

Here are some of the reasons why Okolite-insulated cable was chosen for this important installation:

Long-lived, electrically-strong Okolite insulation resists corona cutting, heat and moisture, requires no lead sheath, even when totally submerged. Okolite has an outstanding record in submarine cable service for voltages up to 35,000 volts.

All Okolite-insulated cables, whatever their end use, are subjected to super-voltage a-c and d-c tests considerably in excess of industry specifications.

On any installation where uninterrupted service is imperative, Okonite is your best cable buy—to be sure. The Okonite Company, Passaic, N. J.

OKONITE SINCE 1878

THE BEST CABLE IS YOUR BEST POLICY

insulated wires and cables

1439

Top Quality PERFORMANCE at LOW MAINTENANCE COST
Make Revere ELECTRIC MFG. CO. LIGHTING EQUIPMENT
A Sound Investment!

REVERE covers the field with a complete Quality Line of Airport - Street - Service Station - Sports - Outdoor Theater - Marine and Industrial Lighting Equipment. The BEST in engineering skill, the BEST material that money can buy, the BEST in assembly and construction, go into every REVERE unit. All down the line . . . it's the line for you to sell or specify for complete satisfaction.

A FULL LINE OF LUMINAIRES for MERCURY or INCANDESCENT LAMPS embodying many new INNOVATIONS

THE FAMOUS REVERE 4200 ENCLOSED 750-1000-1500 WATT FLOOD

CODE BEACONS AND FLASHERS

SINGLE OR DOUBLE OBSTRUCTION LIGHTS

HINGED POLES FOR STREET LIGHTING and other HIGH MOUNTING JOBS

Write for CATALOG

WHITE-WAY PYLON-LITES for Boulevards and Residential Lighting

REVERE ELECTRIC MFG. CO.
6016 BROADWAY CHICAGO 40, ILL.
Stocked by: L. M. Baxter & Co.
San Francisco — Seattle — Portland
Los Angeles Rep.: BRACKEN SALES AGENCY

Operator's Desk

(12) Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Wayne & Windrim Ave., Philadelphia 44, Pa.

A single operator may obtain plant temperature readings from up to 96 processing points in about as many seconds while seated at a newly designed console desk, it has been announced by the manufacturer. The console is a 60-in.-wide steel executive-type office desk arranged with cutouts to accommodate an ElectroniK precision indicator and key switch banks or push-button assemblies. It is made of sheet metal fabricated in special color, pattern and design. It may be tied in with any single, multiple or Colorgraphic panel board.

Outlet Boxes

(13) Keystone Mfg. Co., 23328 Sherwood Ave., Center Line, Mich.

Outlet boxes in three new sizes for heavy-duty industrial electrical installations are of heavy-gage steel with lugs tapped for easy installation and are UL approved. Three ½-in. knockouts are on each side, one at each end and three on the bottom. Sizes stocked: 1½x2⅛x4 in.; 1⅞x2⅛x4 in.; 2⅛x2⅛x4 in.

Electric Plug

(14) Hopax Electric Inc., 547 Greenwich St., New York 13, N. Y.

A heavy-duty electric plug with a positive, simple locking device is claimed to sell for less than similar units. Known as the Lock-Plug, it is connected in the same manner as any commonly used male plug. It fits any standard twin receptacle. A heavy metal adaptor plate with locking slots fits directly over the receptacle plate and is held tightly in place with a center screw. The plug has a sliding collar equipped with lugs to fit into two locking slots on the adaptor plate. After the plug is inserted into the wall receptacle through the adaptor plate, a slight twist of the plug collar locks the plug in place until released by the operator.

(15) **WELDERS**—Model GA WASP d-c arc welders are available in 150- and 200-amp sizes from Air Reduction Co. Inc., 60 E. 42nd St., New York 17, N. Y. The volt ampere characteristics of these machines make them especially suited to d-c straight polarity Heliwelding with Thor-Tung, the manufacturer states.

(16) Impedence matching between open-wire lines and cables used in carrier communication may be effected by use of toroidal loading coils now available in several values of inductance and in a number of physical arrangements. Coils are wound on high-stability iron powder toroidal cores. Applicable to circuits using carrier frequencies of 3 to 35 kc, these coils in particular combinations form a tuned loading system that provides a substantially flat nonreactive impedance characteristic throughout most of this frequency range, according to the manufacturer, Lenkurt Electric, 1105 County Road, San Carlos, Calif.

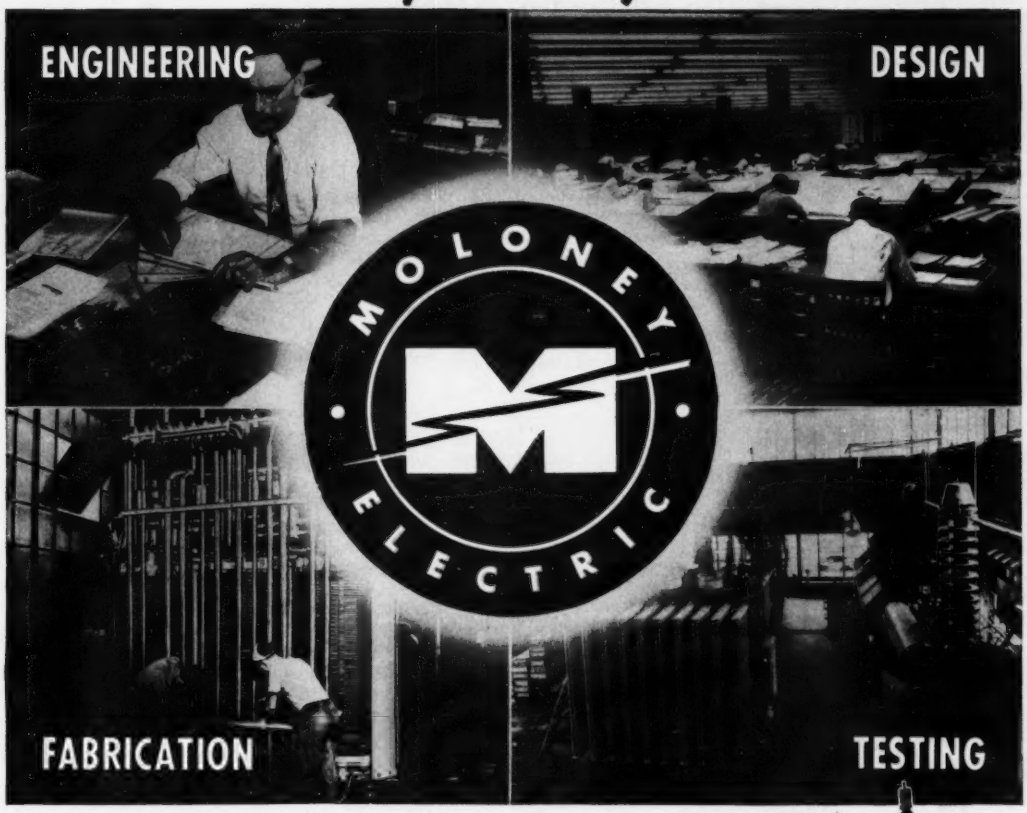
Cable Clamp

(17) The Adalet Mfg. Co., 1433 Lorain Ave., Cleveland 11, Ohio

A quarter-bend cable clamp, the Sky-Tie, for bus-drop cable has been designed to allow quick installation and ready rearrangement of machine tools. Two identical pieces form the fitting and installation is by tightening two bolts with the support in position. A spring fits onto the Sky-Tie tangentially to its bend, ties back to a structural member and absorbs vibration or shocks. The spring may be used on loads as high as 125 lb. The manufacturer points out that weight of the cable does not necessarily determine the spring requirement, but rather the pull needed to keep the horizontal run of cable from sagging.

(18) **AIR DRYER**—An electric dehumidifier that can remove from the air up to three gallons of water per day is designed for photographic dark rooms, bank vaults, print shops and other interiors where excessive moisture is a problem. The dryer is large enough to dehumidify an enclosed space up to 10,000 cu ft. For areas where relative humidity conditions do not require continuous operation of the unit, a timer is available as an accessory. Product of Westinghouse Electric Corp., Electric Appliance Division, East Springfield, Mass.

for *Power Transformers* of *Superior Performance*



WHEN you specify Moloney Power Transformers you are specifying *"superior performance."* For over 50 years Moloney has been accumulating experience, skill and facilities to make this possible. You will know beforehand that from your Moloney Transformer, which can be test-proved on our 3,600,000 volt Surge Generator, you can expect *better* performance, *greater* reliability and *less* maintenance expense. MES2-2

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers Step Voltage Regulators • Unit Substations

MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

We Can Make
YOUR POLES
LAST LONGER
AND LONGER...
AND LONGER...
AND LONGER...
WITH AN
OSMOSE
INSPECTION AND
TREATING PROGRAM
This program, performed by our highly skilled crews, can save your system hundreds of thousands of dollars in REPLACEMENT COSTS by
1. Absolutely arresting groundline decay of your poles and
2. Giving you up-to-date pole records.
Treatment charge is as low as 4% of replacement costs and pole life is extended for approximately 8-10 years. Let us send you ALL the details!
Write for Free Book
DAN KAMPHAUSEN CO.
CONTINENTAL OIL BLDG., DENVER 2, COLO.

Connectors

(19) Titeflex Inc., 500 Frelinghuysen Ave., Newark 5, N. J.

This line of lightweight electrical connectors was developed originally by the Salsbury Corp. of Los Angeles but will now be marketed by Titeflex. It comes in 17 shell sizes conforming to AN sizes 8-36 inclusive and can be furnished for cord connections, shielded assemblies and bulkhead or box mountings.

The connector design is said to eliminate clamps, save space, facilitate harness assembly and permit easy changes in wiring arrangements. In assembly, the terminals can be removed from the block to solder or crimp the wire to the end of the terminal.

Three-Phase Winding Head

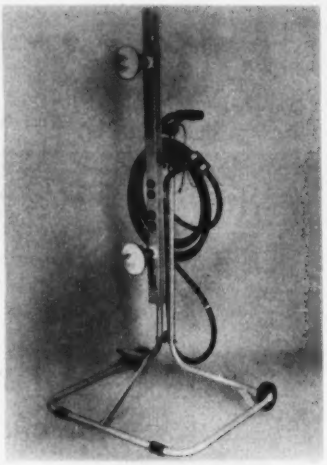
(20) Crown Industrial Products Co., Sycamore, Ill.

A new 3-phase head winds mush-type coils for motors ranging from ¼ to 75 hp and can wind coils from 2¼x5 to 11½x19½ in. A feature is an automatic tension device. When in operation arms are held rigid but, when coil is finished, tension is released by pulling the arms out and turning inward in one motion. A newly designed wire guide permits the operator to guide the wire into the proper place to insure uniform coils and utilize maximum winding speed. The head is adjusted by four permanently attached cranks.

(21) CAVITY RESONATORS—TV interference caused by spurious and harmonic radiations of base station 2-way radio communication equipment can be eliminated by addition of its precision selector cavity resonator, it is claimed by the Motorola Communications and Electronics Division, 4545 W. Augusta Blvd., Chicago 51, Ill. These units are said to minimize spurious and harmonic radiation from a transmitter antenna system and make it possible to use two or more transmitters on the same antenna without mutual interference. A cavity resonator is effectively a very high Q circuit that can be inserted into a line, connecting the transmitters and receivers with the antenna.

(22) CONTACTOR—A solenoid-operated contactor is designed to withstand severe loads based on type C lamps. It is constructed on the straight-line principle and is connected directly to contact bar. Type SC33 is available from Zenith Electric Co., 152 W. Walton St., Chicago 10, Ill., in two models: size 1, 25 amp, and size 2, 50 amp. Either can be supplied in any number of poles.

For more data fill in coupon, page 64



Portable Duct

(23) National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

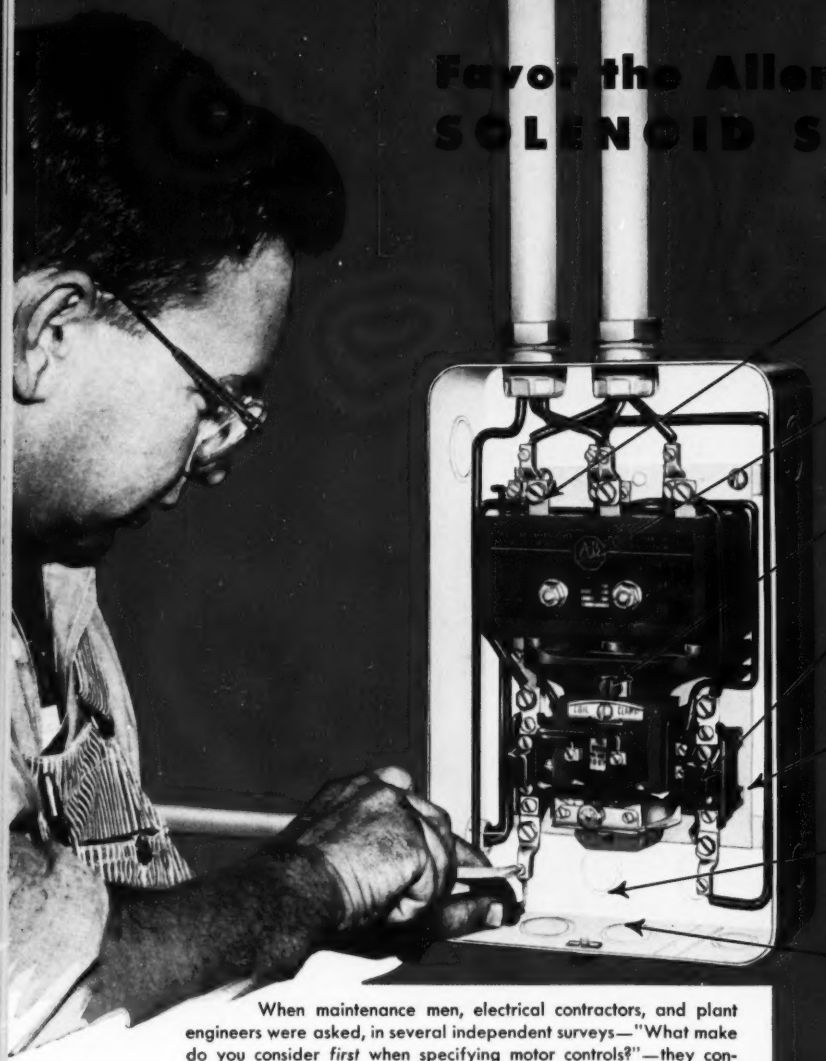
Portable branch circuit extensions that roll power, light or heat to any location in industrial maintenance work, on temporary assembly lines, construction jobs or in underground construction include a power and light unit, a strip of flood lighting and a strip of infrared heating units. Known as the NE Rolla-Duct series, the devices are collapsible and may be carried on public utility service trucks. The strips are fully grounded and have a circuit breaker incorporated in the strip for full worker protection.

The portable assembly consists of a 3-ft 10-in. strip of No. 1700 Surface-duct. This is swivel-mounted on an all-steel tubular carriage. The unit's wheels are made of special materials that are nonconductive, and resist chemicals, moisture and oil and wear.

The carriage-mounted duct is carried on a ball-and-socket swivel that locks into any horizontal or vertical position. It may be raised to a height of 5½ ft or the carriage may be collapsed to roll under jobs. The assembly has a 21-ft power line of 3-conductor heavy-duty Indestructo cable. The units carry an approved rating for 20-amp loads for 115- or 220-v operations, the manufacturer states.

(24) INSULATING VARNISH—Insul-Film, claimed to have the advantages of the silicones but to be less expensive, has been developed by the Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Calif. The new material has a flexible cycle, 300 to 400 F for approximately one hour, and can be sprayed, brushed or dipped, according to the manufacturer.

Why *Maintenance Men* Favor the Allen-Bradley SOLENOID STARTER



ACCESSIBLE TERMINALS
Front connected—easy to get at. Ample space for motor and control wiring. Lots of knockouts.

NO CONTACT MAINTENANCE
Double break, silver alloy contacts never need filing, cleaning, or dressing for perfect operation.

ONLY ONE MOVING PART
One-piece plunger has no bearings to stick, no pivots to corrode. Simplicity means precision.

RELIABLE OVERLOAD RELAYS
Two eutectic solder relays give dependable overload protection. Accuracy unaffected by age.

AMPLE WIRING SPACE
Cabinets generously proportioned to provide ample space for wiring. No skinned knuckles.

WHITE INTERIOR
Enclosures have white enameled interiors for visibility in dark corners and easy installation.

COMPLETE LINE
The Allen-Bradley line includes all sizes from Size 0 to Size 7 in all NEMA types of enclosures.

When maintenance men, electrical contractors, and plant engineers were asked, in several independent surveys—"What make do you consider *first* when specifying motor controls?"—they consistently said—"We prefer Allen-Bradley." Why? Because Allen-Bradley starters are so simple. There are no gimmicks like pins, pivots, levers, or linkages to gum up and stick. There is no contact maintenance, so you can install Allen-Bradley starters and forget them. Allen-Bradley starters are *first* because they are so trouble free.

A-B Quality

ALLEN-BRADLEY

BULLETIN 709 SOLENOID STARTERS

Allen-Bradley Co.
1316 S. Second Street
Milwaukee 4, Wis.

5-52-M

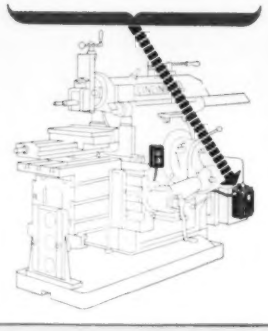
AVAILABLE IN *Three* HANDY FORMS

START-STOP BUTTONS in cover
for 3-wire pilot control

FORM 1 with Start and Stop push buttons for machines where the starter can be located conveniently near the operator.

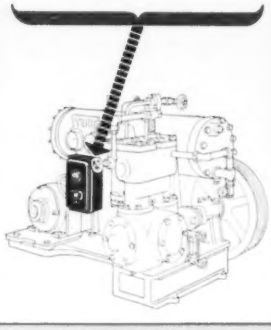
WITHOUT BUTTONS in cover
for 2- or 3-wire pilot control

FORM 2 with plain cover for machines where starter must be operated by remote push buttons or limit switches.



3-WAY SELECTOR SWITCH in cover
for 2- or 3-wire pilot control

FORM 3 with Hand-Off-Auto 3-way selector switch for air conditioners, pumps, and other automatic machinery.

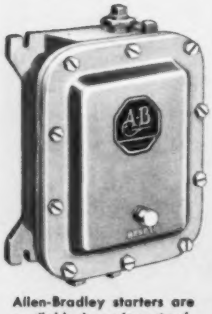


ALLEN-BRADLEY SOLENOID STARTERS

in Enclosures for Every Type of Industrial Service

Machinery designers who realize the importance of selecting the right enclosure for each application are specifying Form 1 enclosures with Start and Stop push buttons for many machines, thus reducing the installation cost of control wiring. For machines requiring manual as well as automatic control, they use the handy Form 3 enclosure. All starters are available in a variety of NEMA type enclosures to meet any service requirement. For full information, let us send you the Allen-Bradley Handy Catalog.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wisconsin



Allen-Bradley starters are available in various standard NEMA type enclosures.

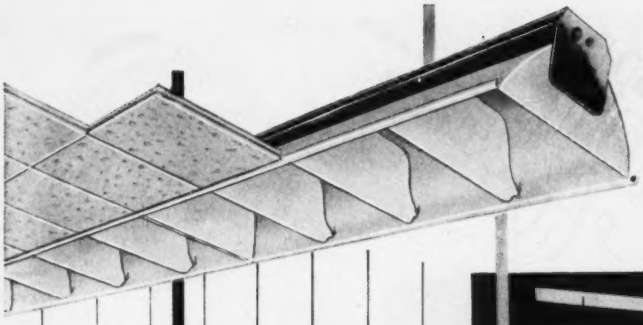
2-52-MR

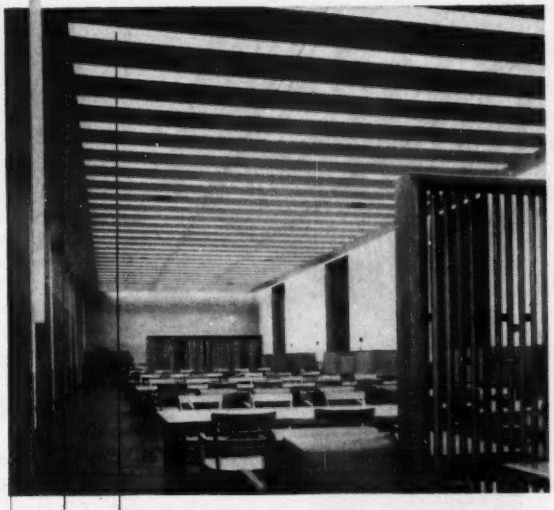
A-B Quality

ALLEN-BRADLEY

SOLENOID STARTERS

QUALITY





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miller leaders in lighting since 1844

Miller lighting systems give you the maximum benefit of *proper* lighting. Easy, accurate vision for best accomplishment. They are engineered for easy installation—for low maintenance—for long service—for finest dollar-for-dollar value. Behind them are 108 years of pioneering and progress in GOOD LIGHTING. There's no need to compromise on lighting that's "almost" right. Miller has a complete line of luminaires—Fluorescent, Incandescent, and Mercury-vapor—that cover a wide range of industrial and commercial lighting requirements—that have been proven in thousands of installations. Light with confidence the *proven* Miller way. Miller field engineers and distributors are conveniently located for nation-wide service.

Luminaire shown is the Miller deep aluminum Troffer—the ultimate in low brightness for lighting comfort. Like all Miller Troffers, units can be arranged to form ceiling patterns as desired—CEILINGS UNLIMITED*

*Reg. trademark U.S. Pat. Off.

Interior shown is Lamont Library, Cambridge, Mass.
ARCHITECTS, Coolidge Shepley Bulfinch and Abbott, Boston, Mass.
LIGHTING ENGINEER, Willard Thompson, Boston, Mass.
ELECTRICAL CONTRACTOR, Hixon Electric Co., Boston, Mass.

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SINCE 1844

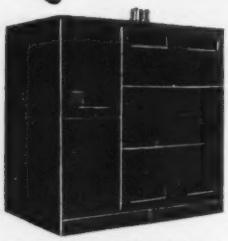
ILLUMINATING DIVISION: Fluorescent, Incandescent, Mercury Lighting Equipment
HEATING PRODUCTS DIVISION: Domestic Oil Burners and Liquid Fuel Devices
ROLLING MILL DIVISION: Phosphor Bronze and Brass in Sheets, Strips and Rolls

TYPE C

General purpose transformers, 600 volts and below; 1-15 KVA inclusive, single or three phase

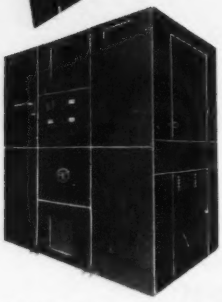
HIGH efficiency

MARCUS DRY TYPE transformers



450 KVA, Type F Unit Substation, 4160 V. Delta, 60 Cycles, 3 Ø—120/208Y, 4 wire.

LOW maintenance



1500 KVA, Type F Unit Substation, 4800 V Delta 60 Cy, 3 Ø—120/208Y, 4 wire.

Years of specialization in the dry type transformer field have resulted in a far superior product. Being ahead of the rest of the field is the natural result of continuous effort and research in uncovering new materials which are your constant assurance of maximum transformer value.

MARCUS DRY TYPE, AIR-COOLED TRANSFORMERS

ARE SAFE — No explosion or fire hazards. No fire proof vaults. Class B and C heat proof insulations.

ARE ECONOMICAL — Lower cost installation and operation, negligible maintenance.

For the transformer that's second to none, specify MARCUS.

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- UNIT SUBSTATION
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- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING
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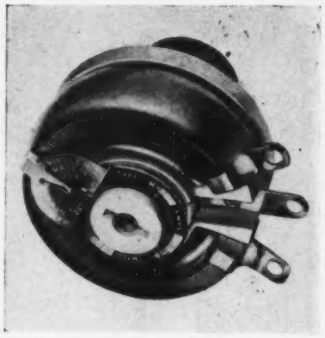
40 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS



Redesigned Rheostat

(25) Hardwick, Hindle Inc., Newark 5, N. J.

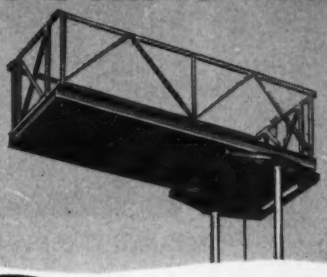
This 50-w rheostat for industrial applications is claimed to have a greater safety factor because of its high-temperature enamel. The toroidal ceramic form wound with resistance wire is coated and bonded to a refractory base with high-temperature vitreous enamel. Design of the contact arm permits use of a bus-bar-type brush that affords a minimum of resistance between the resistive element and collector ring, the manufacturer states. The self-adjusting feature is said to give positive smooth electrical control. Terminals are made of strong corrosion-resistant alloy. Designed to comply with standards of Military Specifications JAN-R-22; RTMA; NEMA. Underwriters' listed.

(26) **RESISTOR** — A corona-protected high-voltage resistor contains five series-connected 1-megohm resistors rated at a precision of 0.1% at a temperature of 74 F. Each of these units, 2¾ in. high and 10 in. in diameter, bears a normal rating of 5 kv, a maximum rating of 7.5 kv. Voltage drops from 5 to 100 kv, involving a maximum current drain of 1 ma, are secured for voltage-measuring operations with this type 1001 resistor made by Astro Electric Co., 1302 County Road, Belmont, Calif.

(27) **OHMMETERS**—Models 244A and 246A are claimed to master the problem of change in internal resistance in batteries from aging; to be capable of high accuracy in a small self-contained unit. Model 244A has ranges of 0-50, 0-500, 0-5,000, 0-50,000 ohms, with lowest cardinal point of .05 ohm at ⅛ in. distance from zero. Model 246A has ranges of 0-100, 0-1,000, 0-10,000, 0-100,000 ohms, with lowest cardinal point of .05 ohm at 1/16 in. from zero. Made by Associated Research, Inc., 3758 W. Belmont Ave., Chicago 18, Ill.

(28) **BALLAST**—A sequenstart F ballast for two 96T12 lamps is offered by Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill. It is a series-sequence type ballast and is designed to meet the Certified Ballast Manufacturers' Supplement No. 1 to American Standards Association Specification C82.1.

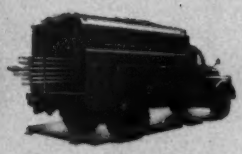
"The Accepted Standard with Utilities Everywhere"



Proved by many years of trouble-free service, *Powers-American* bodies set the pace as the number one choice with utilities everywhere . . . the measurement of top quality and performance throughout the industry. "Job-engineering" steps up crew efficiency, lowers operating costs . . . protects your investment. *Powers-American* has the type body and equipment to do your particular job most efficiently and at lowest cost.

HYDRAULIC TOWER

Platform extends to 30' above ground and can be revolved full 360°. Operation is controlled from truck cab or by workman on platform. Models are also available in ground-to-platform heights of 21' and 25' for installation on chassis having a rated capacity of 1½ tons or more.



LINE CONSTRUCTION BODY (600)

Available in 9' to 14' lengths, equipped to meet individual needs in any phase of utility work.

REVOLVING AERIAL LADDER

Models available in working heights of 23' 6", 26' 6", 30' 6", and 32' 6" for all styles of bodies.

LIGHT CONSTRUCTION BODY (SERIES 35)

Ideally suited for all types of light duty maintenance and construction work.

MAINTENANCE BODY (400)

Designed for medium duty general service. May be furnished with winch and derrick capable of handling 40' poles.

POWERS *American* DIVISION

ACF

PUBLIC UTILITY BODIES AND EQUIPMENT

McCABE-POWERS AUTO BODY COMPANY

423 Fifth Street, Oakland 7, California

There are many styles of *Powers-American* Bodies not shown here. Write for descriptive catalog today.

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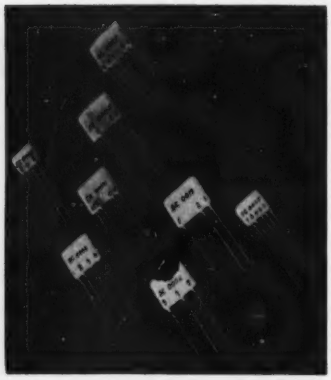
BRONCO 60
Certified
PORTABLE CORD AND CABLE
YOU GET
• MORE NEOPRENE IN THE PROTECTING JACKET! It is Certified to contain not less than 60% by weight of new Neoprene. This ... INCREASES SAFETY MARGIN, INCREASES RESISTANCE, INCREASES SERVICE LIFE!
• LONGER-LASTING COLD RUBBER INSULATION!
• GREATER FLEXIBILITY!—engineered, rope-like flexibility.
• MORE CONVENIENCE! Jackets are branded with full identifying data. Coils are packaged in neat shelf cartons.
Bears symbol "P116BM," flameproof registration number of the U. S. and Pennsylvania Bureaus of Mines.
Bronco 60 Certified is an Achievement of
WESTERN INSULATED WIRE CO.
LOS ANGELES 58, CALIFORNIA



Printed Electrical Circuits

(29) Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.

A compact unit combines a resistor and capacitor electrical circuit, with external leads for connecting into an electrical assembly. A number of standard circuits are available, some of which incorporate as many as six separate resistors and capacitors in a permanent circuit. Special circuits can be made to meet individual requirements.

In producing these circuits patterns for resistors, capacitors and conductors are printed on vitreous high-dielectric ceramic plates by a silk screen process. The dielectric properties of the ceramic are used for the capacitors, while silver is used for conductors and carbon graphite or other resistance materials for resistors. After the patterns are printed they are bonded permanently to the ceramic surface by controlled curing; then are protected from abrasion and humidity by the application of an impervious plastic covering.

(30) BROODER — Steber Mfg. Co., Broadview, Ill., has designed a 4-lamp infrared heat lamp brooder to foster a brood of 250 chicks. It has a 7-in. hood to protect the lamps. Four heat-resisting sockets are securely mounted and factory wired. Wafer thermostat controls two of the lamps for maximum utilization of electric power.

(31) INDICATOR—A recently developed Harvlie-Boyce indicator is for testing electric motors, solenoids or other magnetic fields. Common use is in trouble shooting and repair of electric motors. When used in trouble shooting an ailing motor, the exact location and nature of the trouble can be quickly and accurately learned, according to the manufacturer. Details may be secured from H-B Indicator Co., 915-B Terminal Sales Bldg., Seattle 1, Wash.

For more data fill in coupon on page 64

Nicopress
SUSPENSION DEAD END

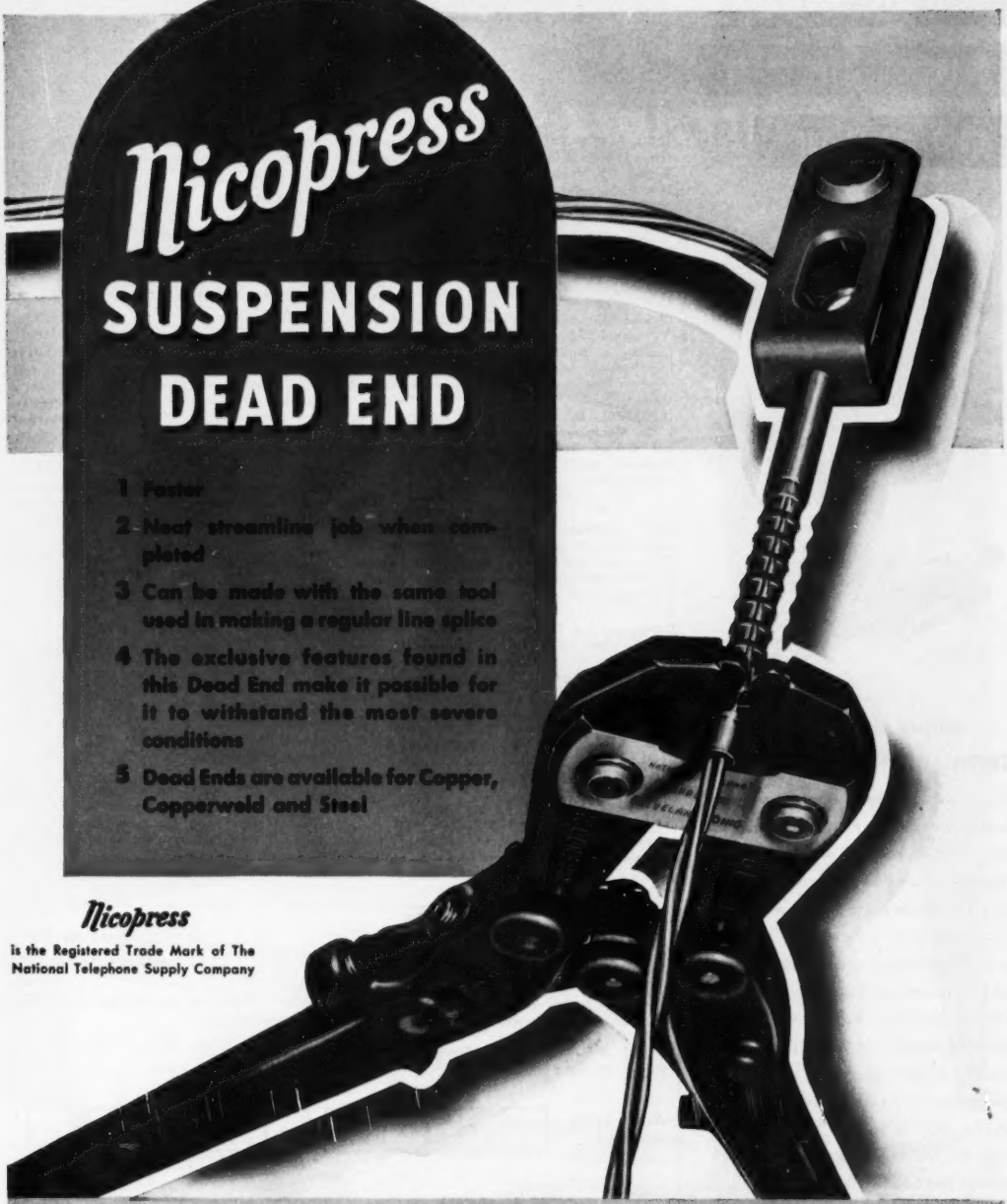
1 Faster

2 Neat streamline job when completed

3 Can be made with the same tool used in making a regular line splice

4 The exclusive features found in this Dead End make it possible for it to withstand the most severe conditions

5 Dead Ends are available for Copper, Copperweld and Steel



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CONDUIT OR PIPE BENDS

RIGHT ON THE JOB

...simple, quick with the

GREENLEE HYDRAULIC BENDER

Yes, quickly make bends *exactly* as you want them, when you want them, where you want them. Compact, portable GREENLEE Hydraulic Pipe and Conduit Bender lets you do this in a jiffy. *One-man operated* to produce smooth, accurate bends in just a few minutes . . . in pipe up to 5", rigid and thin-wall conduit, tubing, bus-bars. Owners report timesavings up to 60% and more, elimination of cost for manufactured bends and fittings, and "clean", tailor-made installations every time. Get facts now on this time-saving tool that often pays for itself on first few jobs! Write for free Bender Booklet, Greenlee Tool Co., 1703 Columbia Avenue, Rockford, Illinois.

GREENLEE

Other GREENLEE timesaving tools for electrical work: Hand Benders; Joist Borers; Cable Pullers; Knockout Tools; Auger Bits and Drills.

BULLETINS ETC.

(32) SAFETY SWITCHES — According to bulletin 514 from BullDog Electric Products Co., Detroit 32, Mich., the manufacturer has reduced its safety switch line from hundreds to 37 in order to simplify ordering, stocking, installation and use. The bulletin also describes the Vacu-Break principle for arc snuffing, the Clampmatic and other features.

(33) REPRINTS — Two articles from Allis-Chalmers Electrical Review are being offered in reprint form. They are "Supercharged Cooling of Generators" (05R7773), by Sterling Beckwith, engineer in charge of a-c design in the manufacturer's motor-generator section and "Five Stages to Stability" (05R7776), by H. D. Timm, engineer, and T. B. Montgomery, engineer in charge, control section. Both are available from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

(34) CALCULATOR—For electrical contractors, industrial and power company engineers, a plastic calculator shows approximate weight per thousand feet of solid and stranded wire and cable with one, two or three conductors. On the reverse is shown size of conduit or tubing needed for various numbers of conductors when using R, RH, RW, RF 32, RU, RUF, RUW, TF, T, TW and the lead-covered cables, RL and RHL. Allowable current carrying capacities of conductors in amperes is given. A table shows ampere correction factor for room temperatures over 30°. All figures are based on the 1951 NEC. The calculator is available from Triangle Conduit & Cable Co., Inc., Department EW, New Brunswick, N. J.

(35) PERMANENT MAGNETS — A listing of stocked sizes and shapes of Carboloy Alnico permanent magnets is included in bulletin PM-100 from Carboloy Department of General Electric Co., Detroit 32, Mich.

(36) CABLE — A 52-page engineering catalog on its line of electrical wires and cables for the coal mining industry has been published by United States Rubber Co. Copies may be secured from R. H. Turner, Electrical Wire and Cable Department, United States Rubber Co., Rockefeller Center, New York 20, New York.

(37) TEMPERATURE CONTROLS — A 3-color catalog describing design, operating characteristics and installation of 10 variations of the basic Thermoswitch is offered by Fenwal Inc., Ashland, Mass. The 52-page catalog is designated No. 400.

(38) DIMMERS — Redesigned packaged Powerstat dimmers are described in bulletin D651P published by the Superior Electric Co., Bristol, Conn.

(39) LIGHTING FIXTURES — New catalog sheets offered by Day-Brite Lighting Inc., 5411 Bulwer St., St. Louis 7, Mo., include ones on fluorescent luminaires, downlights, recessed units with Holophane Controlens.

(40) DEVICES — A folder describing electrical and lubricating products has been released by Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis. Included are powder-packed renewable, one-time and plug fuses, fuse pullers, Kliplok clamps for fuse clips, Kliplock test clamps and lubricating devices.

(41) SERVICE MANUAL—Cannon Electric Co., P. O. Box 75, Lincoln Heights Station, Los Angeles 31, tells how to use the An-"M" connector in a pocket-size manual recently released.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after May 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

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* Please include your company's name and your position, since we cannot ask manufacturers to furnish literature unless you do.

Notes on Quality **LIGHTING:**

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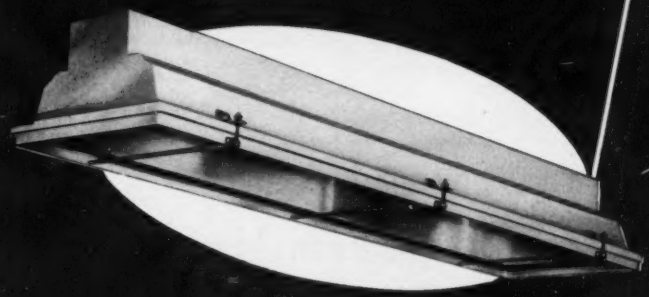

1 Collegiate Slimline fluorescent
2 D-P Line-Light
3 Constellation Slimline fluorescent
4 Educator incandescent
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6 The Master floodlight
7 LH Ceiling light

ILLUMINATION EQUIPMENT
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.

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ELECTRA'S HUSBAND

Edison—Embodiment of American Ideals

"THERE are a lot of notable birthdays in February," Electra mused as she unwrapped her Valentine package on the morning of Feb. 14.

"What do you mean? Yours is in September and mine's in July," I chided.

"I was thinking of George Washington, Abraham Lincoln and St. Valentine," she said.

"You've left out one of the most important ones," I said. "That's Thomas A. Edison. His birthday was Feb. 11."

"Oh yes, I'd forgotten that," she said. "But then he didn't do so much to make him remembered."

Rather than argue with her I pondered her words—"forgotten" and "he didn't do so much." Did most of the people in this country—and the world too, for that matter—feel the same way about this great genius? It must be so, for certainly no one in the electrical business of my acquaintance, had even mentioned the fact that the day before had been his birthday. Why wouldn't it be a good idea, I mused, to turn the lights out all over the world for one minute on the night of Feb. 11 so that everyone, everywhere, would suddenly appreciate what Edison had done for them? What had he done? Suppose somebody were to ask me to spell out his contributions to mankind. What would I say?

Edison—translated into a universal tongue—means light. Not Thomas Alva but Thomas "Aladdin" Edison, for once he rubbed a crude lamp and a whole industry was born. For a lifetime, his lamp-rubbing produced miracle after miracle. Few civilized lips but what at some time have spoken his name, few lives but what have felt some beneficent influence of his handiwork. Small was the spark that animated such great physical genius, yet ever burning more brightly is the light that made him humanity's greatest modern benefactor.

Edison, who stemmed from a long line of nonconformist forbears, would stand out today as a nonconformist. He inherited a stubborn refusal to accept theories as truths until he had proved or disproved them to his own satisfaction through arduous experiment and test. The material contributions of this great disbeliever to the pleasure and enjoyment and comfort of people today are almost legendary. Through him the human voice became immortal; pictures took life and moved; darkness dissolved into light at the merest touch of a finger; space became the carrier of music and entertainment.

The pages of history reveal no other man who so thoroughly revolutionized the life of the world within the span of his allotted years. Electric light, the telephone, the phonograph, motion pictures, radio—to choose but a few from the thousand-odd inventions that bear his name—any one of these would have brought fame to any man. Who of us today can picture a world without one of these inventions?

Born but 105 years ago, he lived to see the fruits of his inventive genius provide work for more than one man in ten; to give employment in whole industries whose investment and output exceed the value of all the world's gold! The human values are in the realm of the infinite — incalculable even with the mechanical brains of today's business machines.

Well might we heed some of the lessons of his life in this period of false and frenzied political and economic doctrines. With Edison, invention was organized work. He recognized a human need and then set his brain to the task of meeting it. By experiment and test, he translated the dreams and the theories of pure scientists into practical, everyday working tools available to all men. The electrical industry can testify to the thoroughness of his methods. Not only did he perfect the electric lamp, but he developed a complicated system of generation, distribution and measurement which made its universal application possible. In giving humanity the comforts and conveniences of electricity alone, he won himself world-wide recognition as a distinguished and true public servant.

Yet important as were his material contributions to human welfare, there is another side to the life of Edison that can serve to guide and inspire us today. His human qualities endeared him to his fellow men. His subtle sense of humor saved him and his fellow workers many a heartache when the road was rough. His modesty, his encouragement of youth, his philosophy of working and living, his courage in the face of almost overpowering obstacles—all these mark him as a great man as well as a great inventor.

Today, when false doctrines and false gods beckon, Edison's life points up an even greater moral. Edison typifies more than any one man the true ideals of Americanism. From the humblest beginning, with only a mediocre formal education, with a physical handicap in the form of poor hearing, he rose by his own initiative and enterprise to the pinnacle of world citizen. Will we as Americans in the year 1952 continue to cherish and preserve that same opportunity for all of our fellows—present and future? Edison loved and labored for his country and for its principles of staunch democracy.

We may say of Thomas A. Edison that he belongs to no generation—he and his contributions to mankind are of the ages. His genius brought comfort, convenience, happiness and entertainment to past and present generations, and will bring more to those to come. So long as man survives the name Edison will stand for great and good public service. Of him the world may always say, "If you would see his monument, look around you."

How could such a man be "forgotten" and who could say of him "he didn't do much?"

"IT'S convention time again I suppose," said Electra the other day. "What good are all these meetings anyway," she asked. "Why," I said in surprise, "these conclaves bring together men with common problems for a free exchange of ideas, and save the various branches of the industry untold thousands of dollars. They are most worth-while."

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Typical scene before program of removing roadside trees, at left. Right: Trees trimmed to clear primary and street light circuits

Tree Trimming Should Be on the Way Out

A philosophical approach to the problem that eventually will lighten the burden of high costs now borne by utilities for tree trimming and brush control

Frank G. Mackaness

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The control of vegetation is a problem that vexes every utility in the West, for while it is vital to good service it contributes nothing to it and the cost, already high, is mounting with every rise in wages. There are few operations in which utility management would rather see economies.

That part of the Pacific Northwest on the oceanside of the Cascade range has a moist mild climate that makes plant life grow with a vigor found in few places outside the tropics. The resulting riot of vegetation is responsible for much of the scenic grandeur of the region and much of the storm damage to power lines. While bringing wealth to the lumber industry it brings only grief to line superintendents. Over the years this region also nurtured a curiously inconsistent citizen who is at once very little interested in the felling of a forest, but rabidly opposed to trimming so much as a twig from the tree that obscures his street light or tangles with his electric service.

In most utility accounting systems the removal of trees, limbs or brush is recorded in a catchall account often called "tree trimming." This is unfortunate in some ways because it confounds urban with rural lines and pruning with tree removal, brush slashing and sometimes with weed killing. About all such figures tell is that "tree trimming" in all its forms is an expensive job.

The costliness of tree trimming has driven many companies to seek cheaper ways than hand pruning and slashing to keep their lines clear. Each company tackled whatever facet of the problem was most grievous on its own system, and in many cases devised procedures or machines that effected substantial savings. Very few companies approached vegetational control as an over-all problem, making one trained man responsible for an interlocking program.

Where companies have taken this approach, they seem to be doing a better job than the others. The implication is that here in the Pacific Northwest the time has come for each company to re-examine the way it spends its money to control vegetation from the weeds in its window boxes to the trees bordering its transmission lines. This study logically then should be extended to methods employed by neighboring companies and whatever internal organizational and procedural changes seemed wise could be made in the light of these findings.

In the days when a tree growing in the line called for the axe or the saw

Scene along country road (left) after trees have been removed and stumps sprayed. Right: Well-planned planting and no tree problem

and the weed in the poleyard for the hoe, it was sensible and economical for the local foreman to use whatever labor he had free for a few days to do the work. With the advent of a device called an Industrial Monkey, pneumatic pruning tools and the selective weed killers, the problem has been both simplified and complicated. It has been simplified to the extent that with an efficient spray rig roadside brush under distribution lines can be killed and with an Industrial Monkey urban trees can be pruned several times as fast and cheaply as by hand. It has been complicated to the extent that for optimum efficiency each piece of equipment should be used to complement the other, and moreover be used a large proportion of the time.

The high cost of pruning and spraying machines and the complexity of chemicals and techniques are now such that it would be impossible to equip or train every foreman who has done a little tree trimming in the past. For all these reasons, the days of a piecemeal approach to vegetation control so long employed by utilities are fast drawing to a close, and they are fading fastest in the most efficient companies, of course.

High Cost of Tree Trimming

The Portland General Electric Co., serving an area of about 2,300 sq miles at the northern end of the Willamette Valley, has 2,356 miles of transmission and 22,375 miles of distribution lines. For the past few years expenditures on maintenance tree trimming on transmission lines have averaged about $20,000 a year and on distribution lines about $185,000 a year. It will be seen that, while these sums are very modest for the area involved, they are substantial enough to make an attempt at savings very well worth-while. About 60% of the expenditures mentioned represent urban work and about 40% work on rural lines. For obvious reasons the urban trees are manicured to a high degree of perfection, a very costly job. Rural lines are freed from hazards as thoroughly and cheaply as is commensurate with good service.

No matter how the work is done, management deplores the amount the superintendent spends on pruning trees and the superintendent deplores the fact that he cannot spend enough more to grub them out and be rid of them forever. The undeniable fact is that trees growing under overhead wires are a persistent nuisance that utilities have learned to live with only under protest. It is the writer's belief that it is now practicable to separate these incompatible neighbors.

New Approach to Problem

Every city presents a special problem, of course. Few could be more vexing than Portland, where trees and poles share the two or three feet of ground, called "the parking," between the curb and the sidewall on almost every street not served by underground cable.

From every standpoint, aesthetics, traffic safety and economy, the sidewalk would be better if it started at the curb and the trees would be better if they were moved onto the lot. This sounds like an impossibly complicated job. Actually it is worth more than passing consideration because the lives of utilities and cities are both longer than the normal street tree. And with Western cities expanding at a rapid rate there is no excuse for continuing poor planning in the newer sections for the sake of conformity with the old.

The first step might be a demonstration planting of a new area with the proper species of shade trees for city use, set back on the lot to enhance both the individual properties and the over-all beauty of the street. Traffic safety and street lighting of the area would be improved and in ten years, with this area to point to, it would be easier to sell the idea as a civic enterprise. In the interval property owners should be discouraged from planting on the parking strips and from planting unsuitable trees. The transformation would be slow but every tree removed from the parking and not replaced represents a calculable saving to both the power company and the city. This says rather cynically that the property owner claims the trees in front of his place until something has to be done to them, then they are the city's responsibility.

Street where poles, wires and trees must occupy same space (left). Right: Year's regrowth after trimming and removal without spraying

In the country there are places where trees under lines have as definite an aesthetic value as fine street trees. Over the years these should be moved from under the lines back onto the adjoining property much in the same way as suggested for urban trees.

All trees that do not fall into this class should be removed entirely and no new trees should be allowed to replace them by natural seeding or other means. Fortunately all trees start life as diminutive plants and are exceedingly vulnerable in their early years. Hence a program of roadside spraying under rural lines every few years, once the large trees and brush have been removed, will ensure that their kind never becomes re-established.

Reaching that desirable condition when every pole will stand along a ribbon of roadside grass has been a superintendent's dream for many years. But no matter how well his brush crew has worked, up to now the vegetation simply has refused to stay dead. Slashing is about as effective a way to kill brush as is picking apples from a tree.

The millennium was brought closer by the rather recent discovery of the hormonelike weed killers, but it was brought clearly into view when the possibilities of complementing them with mechanical pruning were realized. Permanently clearing rural lines of trees and brush hazards is economically feasible because mechnical pruning has lowered the first cost and spraying now ensures that the pruning job will not have to be done again. Allowing Alder thickets to grow into the wires every few years is a luxury few companies will be able to afford much longer.

Long-Range Approach

A typical tree-trimming program in the future probably will be lifted from its present lowly status under the aegis of some department whose first concern is with line building or something else and placed under a forester or some other trained specialist whose prime concern is vegetation control.

The most logical approach would be a separation between the urban and rural programs. In cities pruning would continue on street trees as hitherto except that the job would be performed from mechanical equipment and with pneumatic tools. Demonstrations would be started and nurserymen, landscape designers, real estate men, civic groups and the city parks department united in a long-term beautification program by education.

In the country piecemeal work would give way to area treatment. Only those trees with real aesthetic value would be pruned. All other weed trees and brush would be eliminated. The work of removal would be put on a production-line basis. A pruning crew with pneumatic tools and a chipper would remove all brush too big to spray, usually that over eight feet in height. The pruners would dose the cut stumps with brush killer in diesel oil to prevent regrowth. A spray crew would follow the pruners and spray small brush using the basal technique in the dormant season or total coverage in the summer. The spray crew would make a second run over the line the next summer after the first treatment and would catch the 15% misses and regrowths. Thereafter, at the first sign of brush invading the cleared area, a repeat spraying would be scheduled but no further pruning would be necessary.

In this program as much good will as possible should be obtained by keeping everyone informed of the way in which they will be benefited. Roadside spraying not only eradicates the dense hedgerows that rob the adjacent fields, it eliminates noxious weeds that pollute seed crops, block ditches, impair drainage, foul up road shoulders and create a traffic hazard.

The type of sprayer and materials would have to be suited to each area so no specific descriptions would be appropriate here. Suffice it to say that brush control by spraying is well beyond the experimental stage. The companies that manufacture chemicals have manuals and field men who can be a great help to anyone starting on a spraying program.

It is hoped that the suggestions made for a long-range program will stimulate utilities to adopt some plan that will lead to lightening the burden of expense of tree trimming and brush control for the future.

Profile of proposed Kings River development. Right: Roaring river falls, Kings canyon, indicative of irrigation and power potential

Kings River May Finally Be Developed

Penstock line furnishing head of 2,336 ft to Balch power house in canyon, lower right

Another forward step recently has been taken toward consummation of a two-generation dream, the development of Kings River for both irrigation and power. On Dec 21, 1951, the Federal Power Commission affirmed its orders of Nov. 10, 1949, subject to certain amendments, which authorized the issuance to Pacific Gas and Electric Co. of an amendment to an existing license to permit the enlargement of its Balch plant and a new license for the construction of additional hydroelectric plants on the north fork of Kings River in central California.

Authorization also was given for the issuance of a preliminary permit to the Fresno Irrigation District for investigation of the proposed development of power at the Pine Flat Dam on Kings River, now under construction by the Corps of Engineers.

Two years' time has been lost because of the intervention of the Secretary of the Interior, and recent action may cause further delay. On Jan.

11, 1950, two months after the issuance of its original orders, the Federal Power Commission permitted the Secretary of the Interior to intervene and granted his application for a rehearing. The Department of the Interior had urged throughout the proceedings before the commission that both the company's and the Irrigation District's applications be denied on the ground that the Bureau of Reclamation proposed to build a hydroelectric project on Kings River.

The commission now has affirmed its earlier action and has said: "These valuable resources should and can be adequately developed in the public interest under provisions of the Federal Power Act."

There still remain some hurdles to be cleared before construction can start on PG and E's $75 million development. On Feb. 18, 1952, the Secretary of the Interior appealed the Dec. 21, 1951, decision of FPC to the federal courts. The case closely parallels the Roanoke Rapids case of the Virginia Electric Power in which the federal courts sustained FPC action in granting a license for development to the private power company. PG and E hopes similar action will be taken by the federal court in this most recent litigation in the Kings River case.

Balch power house licensed by FPC in 1922 contains one 33,000-kva unit. Under proposed development by PG and E this plant would be increased to four times present size

Development Long Planned

Development of power on Kings River was proposed way back before World War I; its desirabilty was stimulated by that war; comprehensive plans were developed in the early twenties; one power plant containing one of the planned four units was constructed; efforts again were stimulated by World War II only to be stymied by conflicting interests.

In addition to the usual provisions for licenses under the Federal Power Act, the Dec. 21, 1951, order of the commission specified that the company (1) enter into an agreement with the Secretary of the Army, or other appropriate officer of the United States, covering the reservation and use of, and payment for, sufficient storage space in Pine Flat reservoir to permit reregulation for irrigation purposes of the water released from the proposed power reservoirs, and (2) reach a satisfactory agreement with the local irrigation interest providing for the use by the company of the waters of Kings River for power purposes.

No river in the United States is more fully developed for irrigation than the Kings. No farming area is more diversified or more fully productive than the area watered by the Kings. This rich farming community did not just happen. It was built by hard work and enterprise and its productiveness is dependent upon water. For generations the farmers of the Kings River area have conserved their water supply and protected their vital rights to that water. There were conflicting claims to some of this water.

Over the years, these conflicts have been resolved so that now full agreement has been reached and the rights are administered by an association representing all of the water users.

Except in the wetter years, there is insufficient water and the farmers must supplement the surface supply by pumping from wells. In years of large runoff, the water goes down into the Tulare Lake basin and floods the land. The United States, through the Corps of Engineers, is constructing Pine Flat Dam and reservoir (see profile) to prevent these floods. The reservoir also can serve to regulate the river flow better to meet the requirements for irrigation and thereby reduce the pumping from wells.

The water users, however, must pay the United States for such use of the reservoir, and for years they have been attempting to reach an agreement as to the amount of this payment. They desire full control of the operation of the reservoir subject only to flood control requirements, and they object to any regulation of their water except by their own association.

Engineering studies of the records of past flow of Kings River indicate the possibility of multiple use of Pine Flat reservoir for the three purposes, flood control, reregulation of water stored upstream for power purposes and regulation to meet irrigation requirements. Flood control will be primary and no interference will be allowed. Possible interference between the other two purposes can be resolved. Pacific Gas and Electric Co. proposes to commence construction of its power projects as soon as negotia-

tions with the association have been completed and upon favorable decision in the litigation recently arisen.

Plan of Development

Beside enlargement of its Balch plant to four times the existing installation, the company's plans, as authorized by the Federal Power Commission, include two storage reservoirs and three new power plants. The two storage reservoirs will be created by construction of rock-fill dams across Helms Creek and the north fork of Kings River, respectively. These are shown in the accompanying profile.

Helms Dam will be about 290 ft high, about 940 ft long, and will create storage capacity of 102,500 acre-ft in a reservoir some 1,400 acres in area at elevation 8,170. Water will be released into Helms Creek and will flow down into Wishon reservoir. Wishon Dam will be about 260 ft high, about 3,760 ft long, and will create storage capacity of 128,300 acre-ft in a reservoir some 1,000 acres in area at elevation 6,550.

Planned operation of these reservoirs not only will conserve the runoff from melting snow in the spring for use during the summer and fall of the same year but also will hold water over, particularly in Helms reservoir, from the wetter years for use in dry years. In normal years only about half of the capacity of the reservoirs will be used.

It is not presently planned to develop power at Helms Dam or between Helms and Wishon. However, a plant to be known as A. E. Wishon power house is planned just below Wishon Dam. A single, variable head, Francis turbine of 19,000 hp direct connected to a 15,000-kva generator will be installed. Maximum head will be 250 ft.

Discharge from the A. E. Wishon plant or other outlets from the reservoir will be diverted into the Haas tunnel for use at another new plant downstream to be known as Haas power house. A regulating reservoir with about 300 acre-ft of effective capacity will be created by a 60-ft concrete arch dam. An intake structure will divert a maximum of 760 cfs into a 12x12.5-ft tunnel some 30,000 ft in length. A surge chamber will be constructed near the end of the tunnel, from which the flow will be conveyed to the power house by a welded steel penstock. This will consist of 4,100 ft of single pipe 108 in. to 78 in. in diameter, 2,400 ft of two pipes each 60 in. to 58 in. in diameter and finally six pipes leading to the nozzles. Pipe thicknesses will range from 3/8 in. to 2 in.

Haas power house as planned will contain three units, each consisting of a 50,000-hp horizontal-shaft double-overhung impulse wheel direct connected to a 40,000-kva generator. Static head will be 2,230 ft. The Haas plant will be located on the shore of the existing forebay of Balch project.

When the existing Balch plant was built (1925-1927), the tunnel was constructed for a water capacity of 760 cfs and the plant was designed for an ultimate installation of four units. However, only one penstock and a single unit were installed. This is one of the highest head plants in the United States, having a static head of 2,336 ft. As presently planned, three more similar units will be added. Each will consist of a 40,000-hp horizontal-shaft double-overhung impulse wheel direct connected to a 33,000-kva generator. The new penstock will be a single welded steel pipe 85 in. to 72 in. in diameter for about 4,040 ft, then two pipes 54 in. to 48 in. in diameter for about 560 ft, then six 30 in. diameter pipes extending about 300 ft to the power house.

Consideration is being given to possible substitution at both Balch and Haas plants of two vertical-shaft multiple-nozzle impulse wheels for the three units as described above, with consequent changes in pipe lines and in generators but with the same power capacity.

Irrigation Conflict

Prior to the construction of Balch plant, attempts were made to reach agreement with the owners of Kings River irrigation water rights to allow construction of one or more storage reservoirs. Consideration was given to construction of both upstream power storage and downstream reregulation storage. However, no satisfactory economic plan was devised.

In order to use the peaking capacity of even the one unit installed at Balch, it was necessary to construct an afterbay as well as a forebay and to operate the two in synchronism so that the natural flow of the stream is not changed by reason of the daily and hourly changes in flow of water through the plant. Construction now of Pine Flat reservoir by the Corps of Engineers will furnish the downstream reregulation not only for hourly and daily variations but for monthly and seasonal changes caused by storage in and discharge from Helms and Wishon reservoirs.

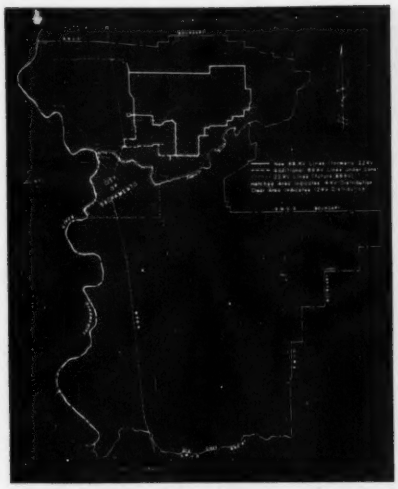
The existing Balch afterbay dam will be raised 32 ft and used for diversion into the tunnel for use in the third new plant, to be known as the Kings River power house. This tunnel also will be 12x12.5 ft in cross section with a capacity of 760 cfs. The conduit will have a total length from intake to the penstock of about 20,200 ft, of which 2,036 ft will be a siphon of welded steel pipe, 108 in. to 96 in. in diameter, crossing Dinkey Creek. The penstock will be a single welded steel pipe 108 in. to 90 in. in diameter about 2,500 ft in length. Kings River power house will be equipped with a single unit consisting of a 54,000-hp vertical-shaft Francis turbine direct connected to a 45,000-kva generator. The static head will be a maximum of 788 ft when Pine Flat reservoir is not full. The plant will be located on the shore of Pine Flat reservoir and will be designed to operate with tail water varying from elevation 948 when Pine Flat is full, to elevation 910 when Pine Flat is drawn down.

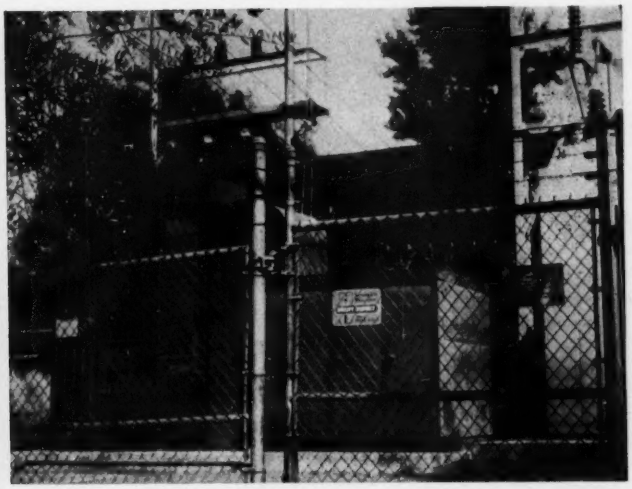
Each of the power plants will be equipped with high-tension transformers and will be connected to the company transmission system. The existing Balch unit now is connected at 110 kv to Piedra and Sanger substations. A second 110-kv circuit will be constructed and both will be used for transmitting Kings River and A. E. Wishon as well as existing Balch generation to Piedra and Sanger. The generation at Haas and that of the new Balch units will be stepped up to 220 kv and transmitted to McCall substation, a major new substation that is now under construction south of Fresno.

Integrated Operation

Because of the extreme variability in the water supply of Kings River, the power generated by plants of the sizes proposed can be used only in a large regional system, such as that of Pacific Gas and Electric Co. When water in large quantities is available and cannot be stored for future use, the plants will operate at high load factors. When water is scarce, they will operate at low load factors.

In general, generation by steam electric plants in the system, of which several have been completed recently or are under construction, will vary oppositely. The steam plants and the hydro plants will complement each other and together supply the demand of the customers. It has been pointed out that power development on Kings River would not be economically feasible without this mingling of steam and hydro generation for greatest economy.





Map showing lines and area cut over to 69 kv and one of the new 67/4-kv unit substations alongside of 22/4-kv unit before cutover

SMUD Converts to 69-kv Subtransmission

Long-range distribution planning showed economies of converting from old 22-kv inherited system to 69 kv. Radio interference-free construction used

Charles R. Day

Electrical Engineer, Sacramento Municipal Utility District
Sacramento, Calif.

Within the first year of operation of the Sacramento Municipal Utility District (1947), it was apparent to its distribution engineers that the unprecedented suburban load growth taking place in the northeast quadrant of the serving area demanded major changes in the distribution system. This area covered about 130 sq miles, only about one-fifth of the total district, and yet estimates indicated that about 50% of the total system load growth was taking place in this particular area.

Eleven small substations totaling 14,000 kva capacity were being supplied from a 22-kv subtransmission loop, radially operated. These served the area at 4.16 kv although a small amount of 12-kv distribution existed in two fringe zones served from another limited supply source. The 22-kv loop was approximately 40 miles around, the major portion of the conductor was No. 2 solid copper and portions of the line were in poor condition. Even with the load that existed then (1947), it was not possible to feed completely around this loop without excessive voltage drop.

Economic Study

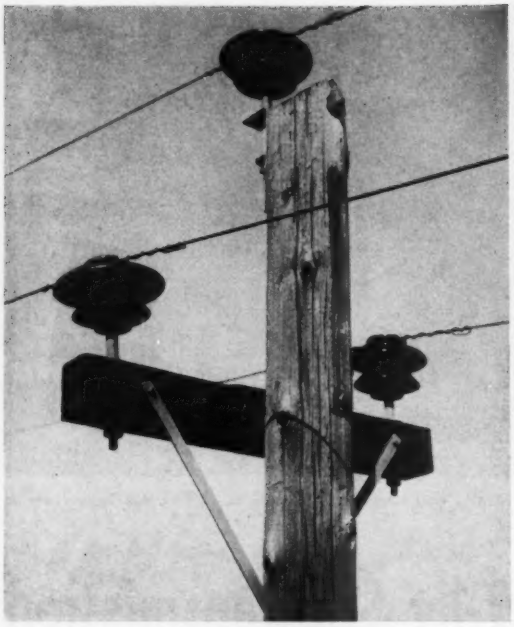
With the domestic and rural load in this area increasing at a phenomenal rate, it was necessary that decisions be made on the future program to be followed to provide the proper service. Engineering studies were initiated that would assist in determining the most economical voltage, both in the subtransmission and distribution systems. In the distribution, four types of system were studied, 4-wire 12 kv, 3-wire 12 kv, 4-wire 4 kv and 3-wire 4 kv. Five load densities representative of those found in the district, 30, 80, 120, 1,600 and 6,400 kva per sq mile, were used.

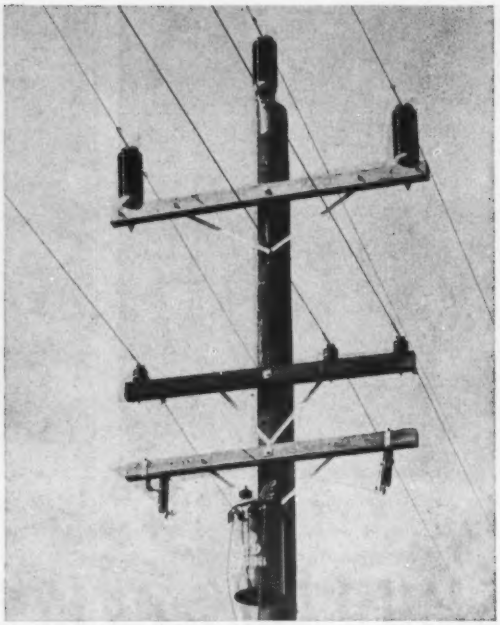
In all cases, the 12-kv distribution definitely proved to be the most economical although the 3-wire vs 4-wire comparison was not conclusive. However, the 12 kv existing in the system was of the 3-wire wye type. In view of preference for this system from a relaying and operating standpoint, it was decided to expand this 12 kv by means of conversion of the 4-kv lines in the low and medium load density areas. It is difficult to justify conversion of distribution lines to 12 kv unless the system can absorb the replaced equipment in other areas. Hence a rather large, rapidly growing area was designated to remain at 4 kv.

Preferred standard subtransmission voltages up to and including 115 kv were studied for a design load of that existing at the time, and also double this existing load. The basis for determining the lines required at each voltage was allowance of a maximum of 10% voltage regulation in each subtransmission loop, with one section of the loop out. It was apparent from these studies that 69 kv was the most economical subtransmission for the system. The margin over the other voltages studied varied from 6% to 40%.

Conversion Program

The decision to convert the existing 22-kv loop to 69 kv was not, of course, based solely on the conclusion of a study that proved 69 kv to be the most economical on a first-cost basis. The minimum amount of work necessary to take care of the immediately fore-





Typical 22-kv pole top (left) on old subtransmission loop. Right: New 69-kv pole top construction showing use of post-type insulators

seeable load at that time would have been a complete change of conductor on the loop. It was estimated that this would approach the cost of conversion to 69 kv with only a doubling of capacity as compared with tripling the capacity with conversion.

Typical of many such problems, the decision on what should be done is easy compared with how to accomplish it. If the area under study were to be served by a 69-kv subtransmission system, it meant that:

1. A new 69-kv supply source would have to be constructed.
2. The existing 22-kv loop would have to be rebuilt and converted to 69 kv.
3. All existing substations would have to be replaced with new ones of the higher voltage rating.
4. Continuing load growth would have to be taken care of in some manner as the cutover program progressed.

Fortunately, it developed that the district's bulk power supplier had plans for a large 100/60-kv supply substation to bolster up its own 60-kv system. The location was to be near the district's 22-kv loop and through cooperation negotiations were completed for a new 60-kv supply point to be available in late '49. The district, of course, preferred a nominal 69-kv supply and still feels that at some future date it may be possible to raise the supply voltage to this figure.

Accordingly, orders were placed for 69-kv line post insulators and switchgear and the job of drafting construction standards and work order estimates for the building of a line of this standard voltage classification was begun.

Unit Substations

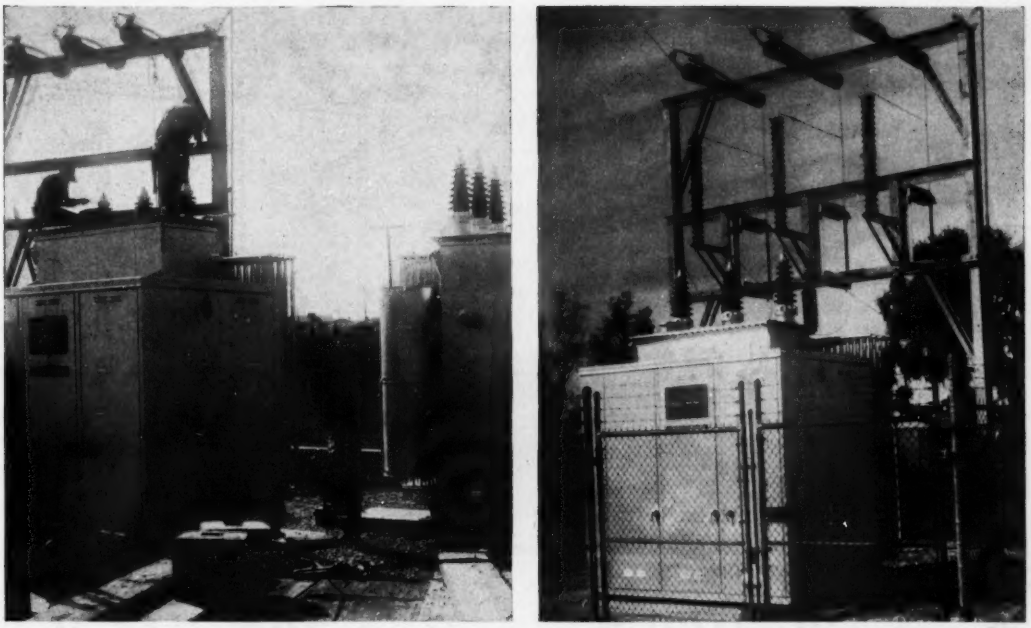
It was decided to utilize 2,000-kva 67/4-kv and 3,000-kva 67/12-kv single-circuit unit substations. These were to be standard in all respects except for the addition of a special 57-kv tap for operation on the 60-kv system. Units of these types were placed on order for delivery in late '49 and early '50. In view of the necessary wait for the 60-kv supply point and the long delivery on unit substation equipment, it became necessary to install some additional 22-kv substation capacity on a temporary basis to take care of the rapidly growing load.

In order to avoid duplication of 4 kv and 12 kv capacity in areas that were scheduled for permanent 12-kv distribution, it was necessary to accelerate the 4-kv to 12-kv conversion program simultaneously with preparing the 22-kv lines for energizing at 60 kv. This complicated the work somewhat but saved the installation of new 60/4-kv equipment in an area where it would have to be changed later to 60/12 kv.

Cutover

Construction on a portion of the line to be converted to 60 kv was begun in the latter part of '49 and the first section of seven miles was energized to serve a new 3,000-kva 60/12-kv unit substation in November of that year. Since the entire project required a high degree of coordination between line construction forces, substation construction forces and system operations, it was necessary to plan the work well in advance of cutover dates. The old 22-kv lines were reinsulated, including the installation of the necessary 69-kv pole-top switches, well ahead of the substation installations. In some cases the new higher voltage substations were installed in the same lot adjacent to the substation to be replaced. In these cases the 22-kv substation continued to serve the load until the new 60-kv substation installation was complete and ready for cutover.

Length of line included in each cutover was confined to the minimum necessary to include one additional substation. This length varied from one to seven miles. These cutovers were planned with due regard for continuity of service to the consumer. In



One of nine new single-circuit 2,000-kva 67/4-kv unit substations at left. Right: Old 22/4-kv unit sub removed in conversion program

most cases they were made with only momentary interruption in service.

After the project was started in November 1949, the work proceeded as rapidly as was feasible considering the many problems involved, coupled with a desire to do the job with a normal complement of the district's construction forces. The last section of line was energized and the loop phased out in October 1951, thus completing the entire 40-mile cutover in slightly less than two years. Substations installed during the project (new locations plus former locations where units were changed) totaled 14 with an aggregate rated capacity of 30,500 kva. More than 30,000 new consumers have been added to the district's lines during the past five years and it is estimated that approximately one-half, or 15,000, of these new consumers have located in the area being served by the new subtransmission loop.

Post-type Insulators

Since the major portion of the route of this line followed country road rights-of-way through densely populated suburban areas, particular attention was given to the pole-top design to keep it unobtrusive and as radio interference-free as possible. Post-type insulators, as illustrated, were selected because of their more pleasing appearance and their inherent design characteristics that assure minimum radio interference.

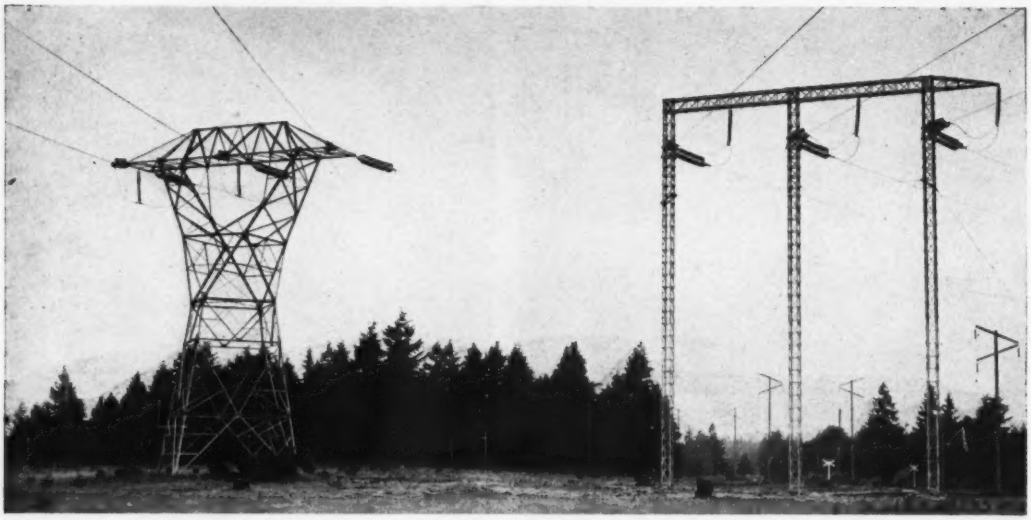
As an additional precaution against radio interference, the line post studs were bonded and the complete pole-top assembly was made with static-proof hardware. Item for item this type of hardware is considerably more expensive than the conventional type. However, this additional cost when added to the total material costs of the line becomes a minor amount, approximately 1%.

The post-type insulator design has a superior leakage-resistance factor as determined by the developed leakage area and consequently the pole top should be less susceptible to fires because of leakage currents. However, as an added precaution the bond wire between the ridge pin and crossarm level was stapled into a spiral around the periphery of the pole for a full turn. With phase-to-ground leakage currents this procedure would have the effect of shorting out the pole gain and distributing the current flow over the surface of the pole rather than having it concentrated at the pole gain where the majority of pole fires start. It was, of course, realized that bonding in general reduces the impulse strength of the insulation but this was not considerad a serious disadvantage in view of the low incidence of lightning storms in northern California.

Triangular configuration was used in the new 69-kv construction mainly because it permits a good compromise in the use of pole height and crossarm length. Since much of the old 22-kv line was constructed with a similar configuration, conversion to the higher voltage was possible in many cases without changing poles.

Although this total conversion project has been completed only about five months at the time of writing, portions of the converted line have been in service over two years. Operating experience to date is excellent, only one outage having been recorded. The line is exceptionally radio-quiet. So far no interference complaints have been received that could be traced to any component of the line.

This decision to undertake this major conversion project has been more than justified by the continuing load growth in this densely populated suburban area. Already the capacity of the new 60-kv loop is being approached and plans for 1952 include another 60-kv circuit of approximately eight miles, and three additional 2,000-kva unit substations in this same area. Studies are also underway to determine the advisability of replacing the existing conductor on the lines as opposed to the building of additional lines along new routes.



Standard steel tower is shown at left and at right a light steel dead-end structure. Both are for 230 kv, 795 MCM ACSR conductor

Bonneville Will Transmit at 300-345 Kv

S. E. Schultz
Chief Engineer

R. S. Gens
Branch of System Engineering

Bonneville Power Administration

A transmission system is being developed to distribute more than 8,750,000 kw of Columbia River power by 1960 throughout the Pacific Northwest. The Bonneville Power Administration is planning to add capacity circuits operating up to 345 kv to its present 2,300-mile 230-kv high-voltage grid for maximum transmission economy.

One major purpose of the Bonneville Act, under which the Bonneville Power Administration functions, is to achieve widespread distribution of hydroelectric power at the lowest possible cost. In keeping with this objective, the administration has consistently endeavored to promote economies in the construction, operation and maintenance of the federal high-voltage grid in the Pacific Northwest. Particular emphasis has been placed on the development of new engineering methods, with the result that the cost of transmitting electrical energy today has not followed the general trend of cost indexes and is probably no higher than it was in 1941. This despite an increase in material and labor costs of more than 100%. Engineering developments therefore have contributed substantially to the administration's ability to render service without increasing rates in spite of the great rise in cost levels.

Relative Cost of Transmission per Circuit

133 miles double-circuit ACSR Falcon (1,000 MCM cu eq) conductor line Chief Joseph-Snohomish

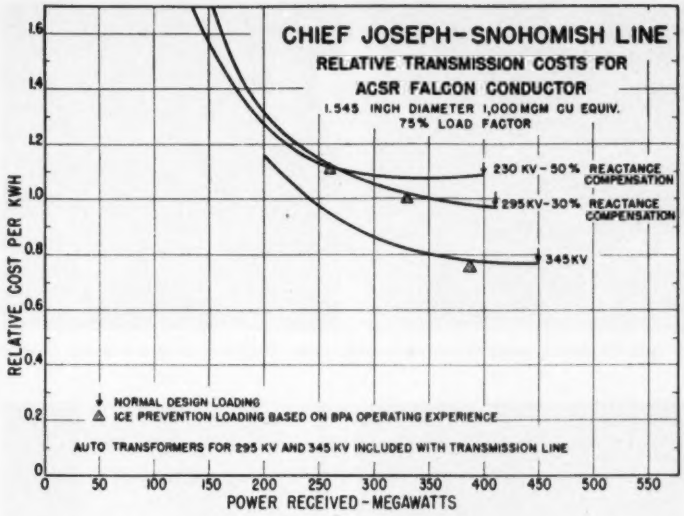
	Loading: 350,000 kw			Loading: 400,000 kw		
	230 kv	295 kv	345 kv	230 kv	295 kv	345 kv
Total equipment	0.56	0.65	0.66	0.49	0.57	0.58
Reactive charges	0.09	0.10	0.03	0.10	0.12	0.05
Losses at 75% load factor	0.42	0.25	0.14	0.50	0.29	0.16
Total	1.07	1.00	0.83	1.09	0.98	0.79

Relative Cost Base: Cost per kilowatt-hour of 230-kv, 500,000 cir mil copper equivalent, 100-mile transmission at surge impedance loading 75% load factor.

Significant Developments

Some of the more significant developements include the use of light steel towers, large transformer banks, reduced insulation levels, improvements in circuit breakers, omission of overhead ground wires through use of reclosing breakers, shunt capacitors, series capacitors and microwave for control and communication purposes, and the use of extra high transmission voltages. Only the application of extra high transmission voltages will be discussed here. Space limitations prevent the detailed explanation of each of the above listed design concepts.

The administration is embarking on a program to utilize voltages in excess of the basic 230-kv grid voltage for the transmission of large blocks of power. The first circuit of this higher



Cost base: Cost per kwh of 230-kv 500-MCM cu equiv. 100-mile line at 75% load factor

voltage will probably be the transmission line from Grand Coulee Dam to Olympia, Wash., a circuit distance of approximately 240 miles. A 70-mile section of this line—Grand Coulee Dam to the administration's Columbia substation near Wenatchee, Wash.—is already completed and operating at 230 kv. The remaining portion is under construction and scheduled for completion in December 1953, at which time the connections at the Columbia substation will be abandoned and the circuit will be continuous between Grand Coulee Dam and Olympia. The circuit is composed of ACSR Pheasant conductor, 800,000 cir mil copper equivalent conductivity and 1.382 in. diameter. Radio noise interference studies indicate that this circuit can be operated as high as 300 kv.

Autotransformers To Be Used

To achieve this higher voltage it is planned to insert autotransformers directly in the line at Grand Coulee Dam and at Olympia. At Grand Coulee the voltage would be stepped up from 230 kv through these autotransformers to approximately 300 kv. Autotransformers at Olympia would step the voltage back down to 230 kv, permitting direct connection to the 230-kv bus at that point. Every effort will be made to avoid the use of 300-kv circuit breakers. Normal 230-kv spacings and insulation levels feature the design of the towers for this circuit.

A number of other circuits on the Bonneville system have similar designs as the Coulee-Olympia line and can be converted to 300-kv operation simply by the insertion of step-up autotransformers at the sending end and step-down autotransformers at the receiving end of the line.

345 Kv Under Consideration

Voltages in excess of 300 kv are being considered for Chief Joseph Dam now under construction with the first generator scheduled to be in service in the fall of 1955. This plant is located 50 miles downstream from Grand Coulee Dam, approximately 150 miles east of the nearest coastal load center. The ultimate installed capacity will be in excess of 1,500,000 kw, a large portion of which will be absorbed in the upper Puget Sound region. The shortest route from this plant to the load area is across Stevens Pass, one of the most rugged and treacherous available routes over the entire mountain range. Elevations in places will be in excess of 4,000 ft. Deep snow will prevent usual means of accessibility during most of the winter months. Two 230-kv lines now pass through this route that can, for practical purposes, accommodate only two more circuits. By looping the existing two circuits through the 230-kv bus at Chief Joseph Dam, a substantial amount of transmission capacity will be available to transmit power westward from Chief Joseph Dam and to maintain a solid intertie with Grand Coulee Dam to the east.

Studies show that the output of Chief Joseph Dam, in addition to other developments in the area, will require that the two additional circuits should each carry approximately 400,000 kw. Design of these new transmission lines will be based on substantially the same factors as those governing previous practices. These call for a single-circuit light-steel design in open country and a double-circuit standard-steel design where space limitations and costly right-of-way clearing are involved. Generally, overhead ground wires will be omitted except in selected areas of high isoceraunic levels. The conductor for the line has been tentatively selected as ACSR Falcon with a diameter of 1.545 in. and the equivalent of 1,000,000 cir mil copper. Designs provide tower clearances to permit line operation up to 345 kv, although for the first several years these circuits may operate at 230 kv.

General studies have indicated that voltages in excess of 345 kv would not be economical for the conditions assumed. In addition, 345 kv was the maximum practicable voltage that permitted sufficient loads to prevent dangerous sleet formation. As in other installations of this kind, a series of studies was undertaken to determine the most economical voltage and switching arrangements at Chief Joseph Dam for the transmittal of its output. These include:

(a) 230 kv operation with 50% series capacitor compensation.

(b) 300 kv operation with 30% series capacitor compensation.

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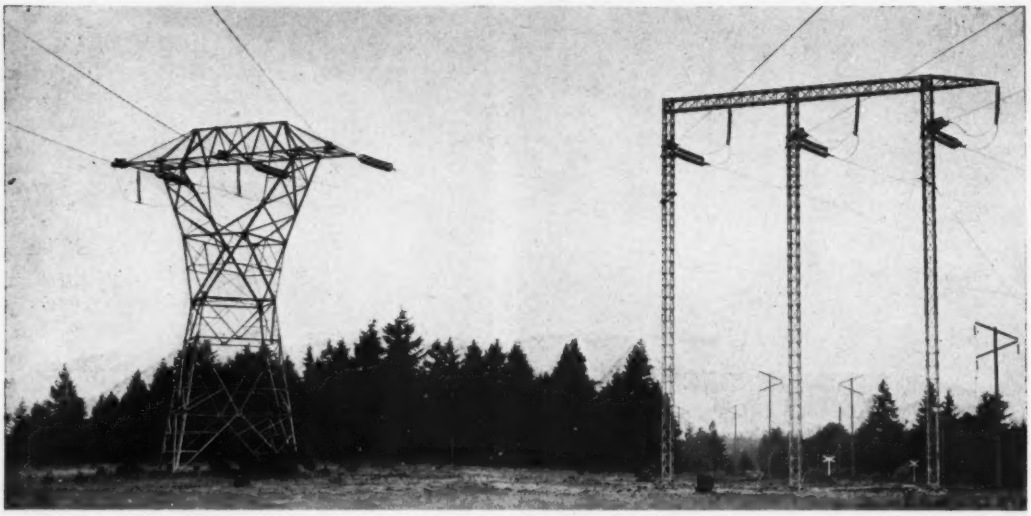
These studies (see table and curves) were on a comparable basis and took into account all the cost factors, including interest on the investment, depreciation, maintenance, and cost of energy and peak losses. In all schemes, provision was made for the full availability of the existing 230-kv circuits at Chief Joseph Dam and for step-down to the 230-kv system in the upper Puget Sound area. Results of these studies show a saving of approximately 30% in the use of 345 kv.

Design and installation details are being rapidly completed so that the final selection of the method of transformation and switchyard arrangement at Chief Joseph Dam will assure the administration an operable scheme at minimum cost with maximum reliability. Only through continuous research and application of new developments can the administration bring the benefits of the low-cost hydroelectric energy to all the consumers in the Pacific Northwest.



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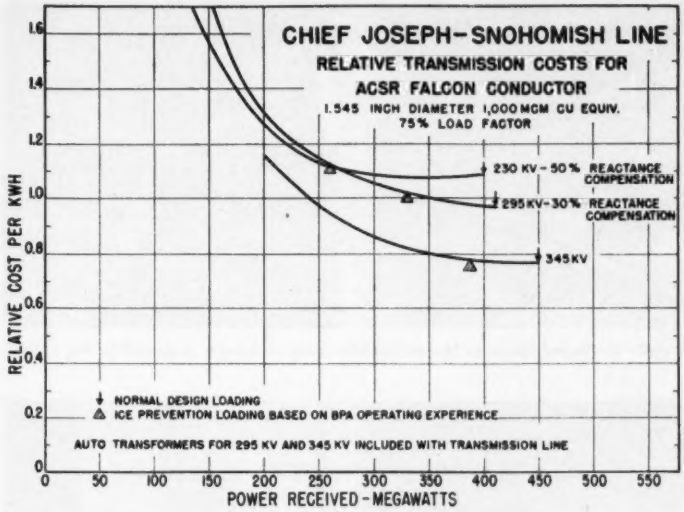
CHIEF JOSEPH–SNOHOMISH LINE
RELATIVE TRANSMISSION COSTS FOR
ACSR FALCON CONDUCTOR
1.545 INCH DIAMETER 1,000 MCM CU EQUIV.
75% LOAD FACTOR
230 KV – 50% REACTANCE COMPENSATION
295 KV – 30% REACTANCE COMPENSATION
345 KV
RELATIVE COST PER KWH
NORMAL DESIGN LOADING
ICE PREVENTION LOADING BASED ON BPA OPERATING EXPERIENCE
AUTO TRANSFORMERS FOR 295 KV AND 345 KV INCLUDED WITH TRANSMISSION LINE
POWER RECEIVED – MEGAWATTS

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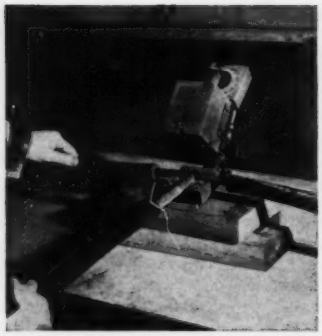
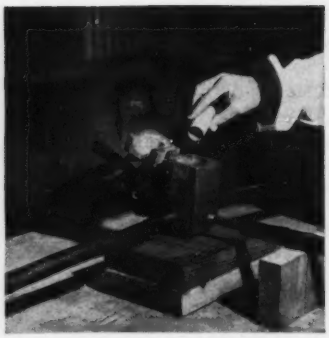
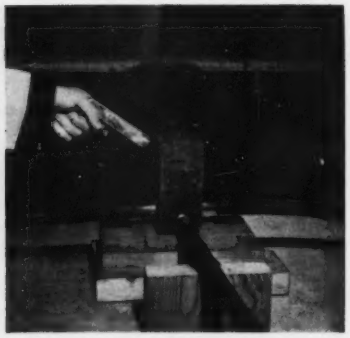
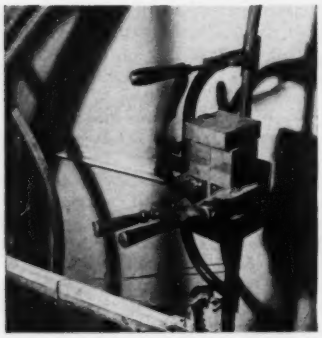
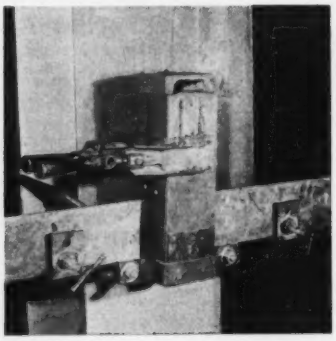




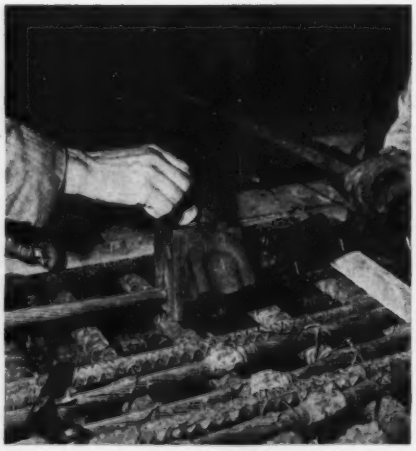
Successive steps in Cadweld process. Left to right: 1. Placing cables in hinged graphite mold. 2. Charge is placed in the crucible



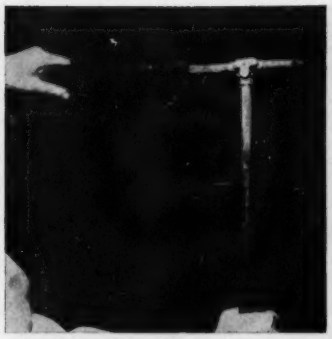


Splicing 500-MCM vertical cable (left). Center: Taped-up splices point up space factor. Right: Mold on ¼x4-in. copper bus bar

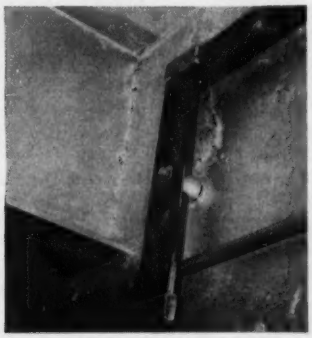
New Process Welds Copper Conductors



Making T joint (1) in grounding cables. 2 and 3 to right: Welding short circuiting cables around reinforcing bars of concrete beam



3. Flint gun ignites charge. 4. Charge burns to produce molten copper. 5. Completed weld. 6. Sawed joint shows pure copper weld



Burning charge (left) welds ¼x4-in. bus bar. Center: Right-angle welds in ground bus. Right: Weld in straight run of ground bus

A new process for joining copper conductors is gaining rapid acceptance on the West Coast. The process, called Cadweld, makes welded, fused or molten joints in copper conductors, bus bars, and copper-to-steel connections. It is of particular interest to electrical contractors and utilities because of the large savings effected.

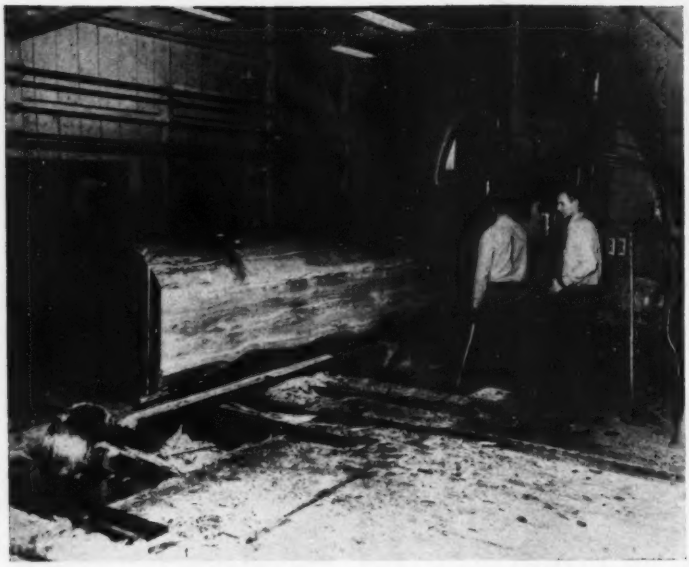
Principle of operation is quite simple. A gunpowderlike charge supplied by the manufacturer is placed in the crucible of a graphite mold, which has been placed on the conductors to be joined. The charge is then ignited with a flint gun. Burning of the charge produces pure molten copper that melts a steel disc over the taphole and flows down onto the conductors, producing a homogenous copper weld. This takes place in a matter of a few seconds. It is a process by which copper oxide is reduced by aluminum to produce molten copper and aluminum oxide slag. The slag is easily knocked off after the mold is removed. Various size charges in paper tube cartons are supplied by the manufacturer for the different welds.

A series of accompanying photographs shows the process step by step. Other pictures show typical applications on industrial wiring jobs. Four applications were noted in connection with securing these staff photographs. One application is that of making the hundreds of joints in 500-MCM conductor in pull boxes by Stetson Electric Co. at the new Statler Hotel in Los Angeles. These are joints in conductors running vertically. One photograph shows the bracket for holding the wires in position and the mold in place. Another shows the taped-up joints in a pull box. This points up the space saving factor and shows that the taped splices are only perhaps an eighth of an inch greater in diameter than the adjacent insulated wire. Large savings are being effected in both material and labor as compared with other methods.

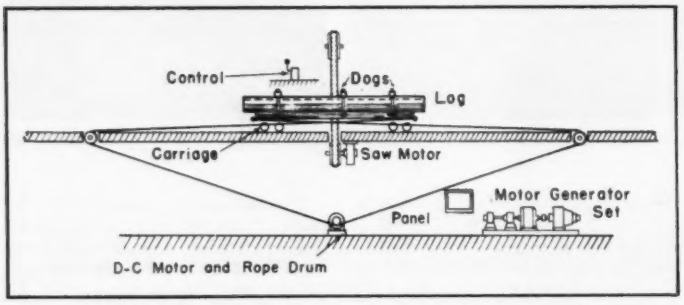
An interesting application is that of welding ¼x4-in. copper bus bars in the Sheet and Tin Mill expansion program at the Columbia-Geneva Steel Division's Pittsburg, Calif., plant of United States Steel. Fishback & Moore, electrical contractors, are doing this job. Cadweld is also being used here for welding wires. Several photographs show this job.

The Bechtel Co., contractor on the Contra Costa steam plant of Pacific Gas and Electric Co., is welding the bare 500-MCM ground cables throughout the plant. Many joints are of the T type with a 250-MCM tap. Two photographs were taken here. One of these shows something of interest beside the weld. It shows the eight 500-MCM short-circuiting conductors per phase placed around the reinforcing bars of the large concrete beam under which the generator leads will run. Induced currents in the reinforcing bars would otherwise produce heat and cause damage to the concrete.

Still another application is one by Pacific Gas and Electric Co. for salvaging the 250-MCM conductor in an old submarine cable. If the cable could be satisfactorily spliced, it could be used for ground cable at substations and power plants. Several test welds showed the practicability of welding this cable by merely cleaning the joint with a steel brush. This despite the fact that individual strands were coated with copper sulphate or blue vitriol from salt water action. A cross section of one of these welds is shown.



Headrig carriage is converted to electric drive in Weyerhaeuser's Springfield, Ore., mill



Arrangement of Amplidyne-controlled electric log carriage drive used to displace steam

Amplidyne Headrig Drive Displaces Steam

Al Arnst
Department of Public Relations
Weyerhaeuser Timber Co.
Tacoma, Wash.

When a pulp expansion program was undertaken in 1950 at Weyerhaeuser's Springfield, Ore., integrated lumber operation it was necessary to take measures to conserve steam. The company's engineering department in Tacoma decided to convert the 14-in. shotgun carriage feed on the sawmill's main headrig to a General Electric Amplidyne-controlled electric carriage drive. This is similar to, but larger than, the one in use at Weyerhaeuser's Everett, Wash., mill. The Amplidyne installation has been trouble-free and successful in operation. It made possible diversion of more steam to the pulp mill. The drive is relatively simple and maintenance has been quite low at both the sawmills.

The Weyerhaeuser Timber Co.'s manufacturing center at Springfield began production in 1949. Producing units on the 460-acre plant site include a 350,000 board-ft capacity sawmill, a power plant and a 250 ton a day kraft pulp mill and container board plant. The container board plant derives much of its raw material from clean, sound wood obtained as sawmill leftovers, such as slab, edgings and trimmings. The power plant uses as fuel the dirty wood not suitable for chipping. Because all leftover wood is thus utilized, either for pulp chips or as hog fuel for power, there is no waste burner or incinerator on the mill site.

The sawmill is a complete lumber production unit with dry kilns, planing mill and shipping facilities for processing about 90% of the lumber output as kiln-dried surfaced material. It has two headrigs or bandmills. The larger one cuts logs up to 42 ft long and 90 in. in diameter. The second headrig, for shorter logs up to 54 in. in diameter, is a 9-ft double-cut bandmill with shotgun feed, electric set works and air operated dogs. The carriage is a four-block unit.

The main bandmill is a 9-ft single-cut long-column headrig with a Filer & Stowell 5-block 90-in. opening carriage equipped with Filer & Stowell air dogs, electric power set works and, as originally installed, a steam shotgun feed. The bandmill is powered with dual-drive General Electric motors, one a 400-hp and the other a 350-hp motor. Most of the drive motors for other sawmill machinery were also supplied by the same manufacturer, driving through gear reducers.

Electric Headrig Saves Steam

Shortly after the mill began operation in 1949, it was decided to increase the capacity of the container board plant from its original 150 ton daily output, because of the large volume of clean wood that was obtainable as raw material from the integrated sawmill and other local mills in the vicinity. Such an expansion program necessitated consideration of steam conservation measures because pulping operations require large quantities of steam for cooking chips, generating power and other uses.

This resulted in the installation of the Amplidyne-controlled headrig drive. Typical arrangement of the drive is shown in the accompanying diagram.

As installed, the drive is designed to move a carriage weighing 72,000 lb, with a maximum log load of 46,000

lb, at a top cutting speed of 450 ft a minute and return speed of 800 ft a minute. Acceleration speed is approximately 10 ft per second per second. Cables are designed for a normal operating pull of 26,000 lb, with an emergency pull of 42,000 lb.

The drive is a variable-voltage d-c drive using a mill-type d-c motor driving the 42-in. cable drum through a special Western Gear speed reducer. Use of the speed reducer permits using the low inertia protected mill-type motor that is especially suited to this type of service. The d-c motor is driven from a motor-generator set consisting of a 400-hp a-c driving motor, a d-c generator for supplying the d-c motor, a small exciter and an Amplidyne exciter. The a-c motor is designed for 300% pull-out torque in order to develop the large power required to accelerate the carriage rapidly. The d-c generator is a duplicate of the d-c motor, reducing the spare parts problem and matching the characteristics of the motor. The d-c motor is directly connected to the generator without any intervening contactors that might require maintenance.

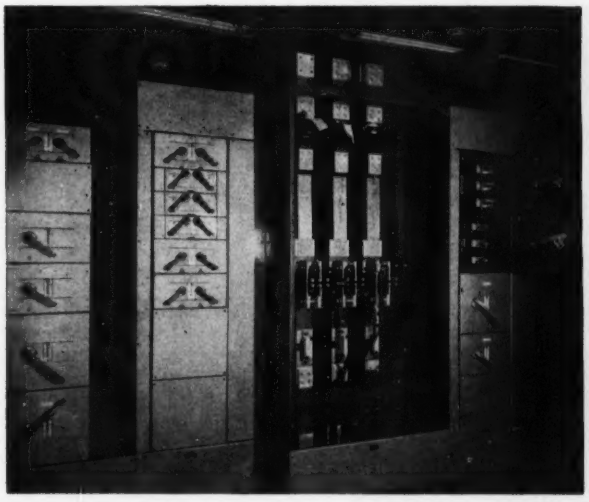
One of the pronounced advantages of the variable-voltage d-c drive is use of regenerative braking to stop the carriage. Not only does it give a fast and smooth stop, but also returns much of the energy of the moving carriage to the motor-generator set and the a-c power line, resulting in very low operating costs.

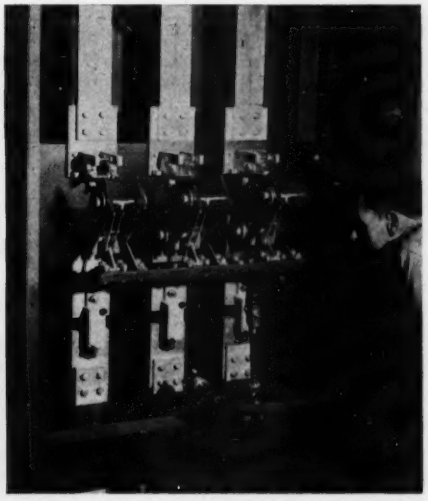
Control of the d-c motor speed and direction of rotation is obtained by varying the d-c generator voltage and polarity. This is accomplished by the use of the Amplidyne exciter to supply the generator field. This Amplidyne is a small d-c generator with special characteristics that permit the use of very small control circuit current, generally ¼ amp or less, at quite a low voltage. The sawyer's master switch controller can, therefore, be a simple potentiometer-type rheostat resulting in smooth and easy operation with a long and trouble-free life.

Other features of the control circuit result in automatic maximum acceleration for even small movements of the sawyer's control, a steady and uniform speed for every position of the master switch and d-c current limit that protects the equipment against damaging overloading regardless of a possible careless operation of the sawyer's controller. This circuit also incorporates limit switches that will stop the carriage smoothly at each end of its travel regardless of the master switch position, resulting in a high degree of safety to the personnel and equipment on the carriage.

Another factor aiding efficient lumber cutting on this headrig is the hydraulically barked logs that permit the sawyer to judge his cants faster and more accurately.

Head sawyer John Wilson is most pleased with the new electric headrig drive.





Pressure Switch for Network Services

A pressure type of disconnecting switch widely used in the east is finding acceptance in the San Francisco Bay region. This is the Pringle switch. It is a low-voltage switch limited to 250 v and was developed to solve the problem of service entrance requirements of large commercial services on underground networks with their tremendous fault current capabilities. The switches are made in standard ratings up to 5,000 amp. An ingenious control lever-actuated mechanism causes the multiple-switch blades to expand within bolt-retained clips upon complete closure. The pressure created between the silver-plated contacts insures full rated current carrying capacity without heating.

The switch itself will break rated currents without distress, and is commonly used in conjunction with fuses or current-limiting devices of the Amptrap type.

The accompanying photographs show a 3,000-amp 250-v Pringle switch mounted on a switchboard in the plant of the Safety Switchboard Co. of San Francisco. The completely assembled board went to the International Dairy Co. for a new plant near Modesto, Calif. Vincent Electric Co. is the electrical contractor.

Conversion to defense work and change of many machines to meet altered product schedules requires electrical distribution be a—

Flexible System for a Small Plant

To convert a small manufacturing plant quickly to defense production, requiring many changes in kinds and location of machine tools, and do it in the face of the tight materials situation, was the problem put up to Bruno Barth, proprietor of San Diego Electric Co., by California General Inc. of Chula Vista.

There were no plans, only an idea of what was wanted. Barth was called upon to engineer it as he proceeded immediately to get the job done. The firm had been making builders' hardware and its original equipment was that for light work in metals. But it had contracts to make parts from stainless steel for the adjacent aircraft industry in the San Diego area. New and heavier machines were being shipped in and plant layout was subject to a great many changes.

If time had been available it would have been an ideal place for bus duct because of its extreme flexibility. But delivery dates for bus duct were so long and need to get under way so great that Barth devised a system as flexible and less costly.

It is essentially a wireway system, using standard 4x4-in. steel National Wire-wa. Barth was able to locate some in Detroit and bought the lot, and thus speeded the job. Parallel, two runs of it, one for lighting, the other power, are mounted on a 3x12 plank which runs the length of the building on both sides, about 10 ft from the floor. This was done with the possibility that later a mezzanine floor might be required above that level.

The transformer pad outside the rear of the 220x60-ft building, and located about the center, was made large enough for future growth. Original installation was designed for 600 hp, but as the plant grows more may be added.

The 480-v for power is taken from the transformers in six 500,000-cir mil extra-flexible conductors through a service entrance head made of heavy metal plate, and into the main switchboard to a 1,200-amp main breaker. Lighting supply at 110/220 is similarly brought in to the main lighting panel.

Conduits tap to wireway but are supported by pipe strap affixed to timber along wall

The main panel has subsections for the 440-v that feeds three phase to the four subpanels, two on each side of the plant. Each subpanel has four feeders from it to supply groups of motors, with individual switch, motor control and local protection on each machine.

Thus if a machine is moved, its own controls and protection is moved with it and not more than a 15-ft run need be made to the wireway to tap a feeder for it.

Similarly the lighting distribution at 110/220 has four subsections on the main panel for four subpanels, two on each side of the building. Wherever local lighting is wanted, a conduit can be run to the wireway to a lighting feeder and back to the lighting panel where circuit breaker protection is provided.

The only underfloor runs are in conduit from the west wall to the east wall, from the main panel to the panels on the other side.

The way power and light is supplied the individual machines is of interest. The two wireways are fastened to the 3x12-in. plank which also supports the end of the conduit so that the wireways themselves carry no weight. The lighting wireway is above the power one.

Conduit from the machine on the

floor is run up vertically to the level of the lower edge of the wireway, then at right angles to the wireway where it terminates in a conduit fitting that is fastened to a knockout on the bottom of the wireway. A stub of conduit is screwed in to the other end of the condulet and this stub is held tight to the wood timber by a pipe strap, thus giving support to the end of the conduit.

A lighting conduit, however, is carried back of the plank into the space between the plank and the wall (the plank being mounted on the I-beams and thus out from the wall). The conduit makes a bend up to a condulet L fitting and thence through a short nipple to the back of the lighting wireway.

Should the mezzanine floor be put in later over part or all of the plant, none of the electrical system would be disturbed or need to be moved. Lighting fixtures and machines under or above that deck could be fed from these same wireways in a similar manner.

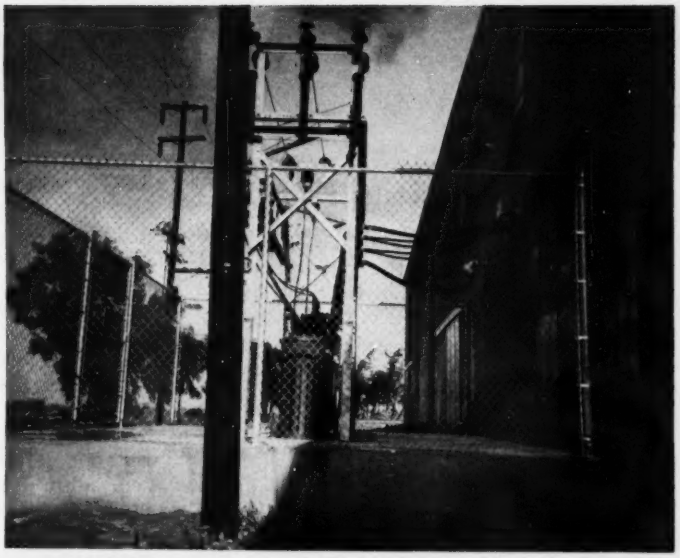
The outside floodlights now tap in through the wall to the wireway directly, as an example.

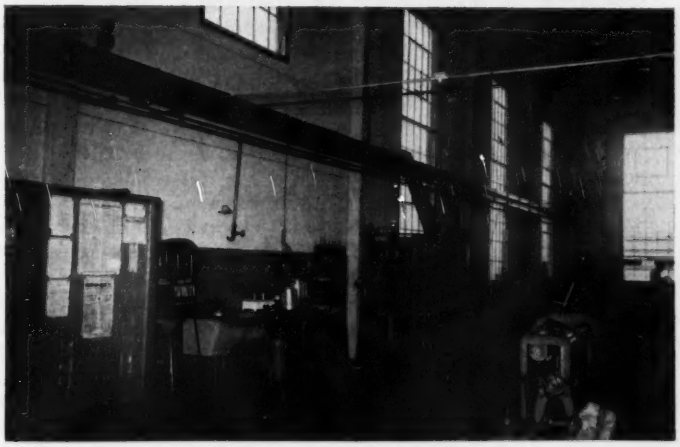
The compressed air line is suspended below the wireways from the same supporting plank, and pipe runs from it parallel the conduit runs for light and power to each machine. This makes a neat as well as a flexible arrangement.

Anticipating future demands, the main panel has 200 hp extra capacity and each of the power panels have four blank spaces for future switches. This type of installation proved more economical than bus duct with practically equal flexibility and it permitted copper savings because only the wire size needed is run as it is required and all wire can be pulled out easily.

General lighting is done from large mercury-type RLM reflectors but lamped with 1,000-w incandescents, 24 ft from the floor on 20x20-ft centers. Initial foot-candle level was 35 but it operates at about 25 to 28 f-c. Large windows and local lighting give extra intensity at the machines.

The offices of the company are lighted by Sunbeam fixtures lamped with the new de luxe white lamps. Washrooms and similar facilities are lighted with incandescent fixtures.





Transformer bank on outside pad feeds in through wall to main panel in second picture. Feeders to other panels and taps to individual machines are run from panels in the two wireways, one for 480-v power, the other 110/220-v lighting. Wireways run entire building length, along both sides. Taps, in conduit, span the aisles

ELECTRICAL WEST

Playing with Jupiter Pluvius

SELDOM do we accord recognition to rumor. However, the persistence of stories about the possible relationship between California's record rain and snowfall and unauthorized cloud-seeding operations merits a warning at least. As precipitation over much of California reached twice normal and as snow packs piled up to depths greater than any heretofore recorded, the cloud-seeding stories increased. Any with a specific interest in increased water supply—especially water conservation districts and utilities—have been accused of sponsoring such seeding. If there is the slightest basis of fact in the rumors, then the need for legislation regulating operations aimed at increasing rainfall is obvious. While there have been no serious floods thus far, there is always the possibility of such disasters. Such a danger will persist until the snow pack has melted normally. There is still much to be learned about artificial rain making. To play with the forces of nature without full knowledge of the consequences is to invite trouble.

"The Public Be Damned"

THE docility and apathy with which citizens and workers of San Francisco accepted the inconveniences, delays and frustrations of a paralyzing strike of the city-owned transit lines last month is truly alarming. Instead of loud public clamor for immediate restoration of a vital public service, the strike was excused by the average citizen with a shrug and the comment, "What can you expect when a bunch of politicians try to run a railway?"

The San Francisco public attitude was in decided contrast to the reaction of a group of Chicago citizens to the service of the city-owned street cars during one of this winter's worst storms. When a crowd of 75 or 80 Chicagoans found themselves stranded on a street corner as three trolleys passed them by and turned into a carbarn, they took matters into their own hands. When the next empty car headed for the barn, it was halted and the shivering folk climbed aboard and refused to get off until they were delivered to their homes. Efforts to dislodge them were met by the statement that, as taxpayers, they were the owners of the street railway system and they demanded service. The car carried them home. The Chicago citizens refused to be pushed around by their political servants.

"What can the public expect when a bunch of politicians try to run a railway?" It can expect a high degree of efficient and courteous service—service equal to or even superior to that provided by a privately-owned utility. However, the public won't get that service until it demands it. Political management is not forced to provide it except by the pressure of public opinion and votes.

Bureaucratic Economics

HERE, verbatim, is a USBR publicity release sent out in connection with the forthcoming Columbia Basin celebration. It is headed "Cost and Repayment—Columbia Basin Project."

"Total cost of the Columbia Basin Project is estimated at $702,500,000. Of this total, approximately $483,000,000 represents costs attributable to the irrigation of 1,029,000 acres.

"The remainder is divided between commercial power ($158,000,000), downstream river regulation ($40,000,000), navigation ($1,000,000), and self-liquidating programs, such as the land purchase program ($20,000,000).

"The costs attributable to irrigation for the initial 500,000 acres total approximately $300,000,000.

"Commercial power sales, in turn, are anticipated to repay more than 75% of the total project construction cost. The remainder, with the exception of one million dollars of nonreimbursable allocation for navigation, will be repaid to the U. S. Treasury by the settlers themselves, making the Columbia Basin Project a self-supporting enterprise, which in turn will contribute millions of dollars in crop and other

EDITORIAL VIEWS

benefits to the national prosperity."

Two aspects of this brief story are notable. One is the subsidy to be provided by power users for the benefit of irrigation. With 22.4% of the investment in facilities, power will repay 75% of the cost of the project. The other is the present cost estimate of $702,500,000. This grows and grows and grows in the fashion criticized in the Hoover reports. In a 1948 Twentieth Century Fund report it was estimated at $398,000,000. In the book *The Water and the Power* published last year with USBR blessing, the estimated cost was set forth as $485,000.000.

Bureaucrats are great economists or are they?

Back to Merchandising?

ALL of a sudden, it seems, normal has returned to the appliance business. This unexpected though long talked about phenomenon came while alarums were still loud that there were drastic shortages imminent. Warehouses quietly were filling despite all the publicity to the contrary. The shortage really seemed to be of customers instead. With this sudden reversal of the supply and demand ratio one of the old unsolved problems of the industry also slipped back through the door, "Who is going to do the selling?"

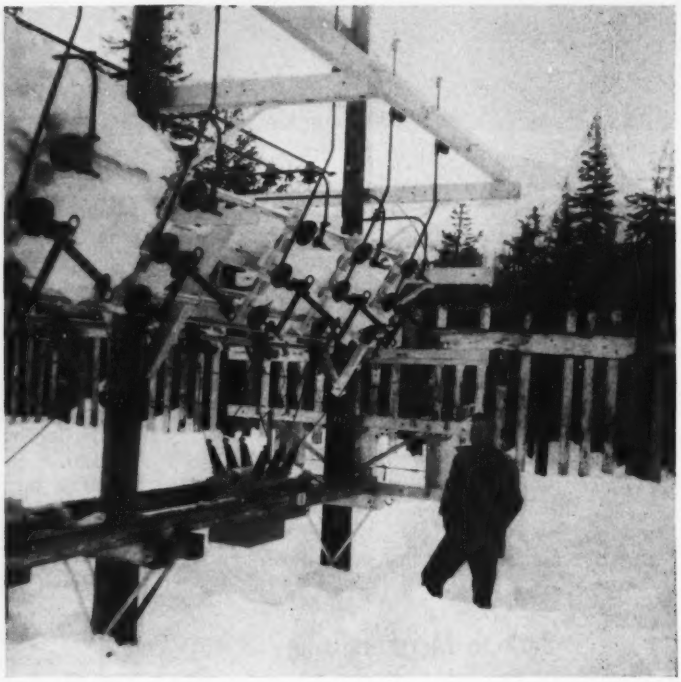
Most of the manufacturers have recently been showing the 1952 models of their wares. At each such showing emphasis has been loud as to the millions of dollars to be spent in national advertising by each to sweep customers into the dealer stores to buy. It is as if all were going to outshout each other. The impression remains that by sheer bombast people will be herded in like rabbits for the kill and that it will not take selling, just cash registers to make change.

It has never been that easy in any time that can be called halfway normal. Artillery and bombing are important aids but it always takes foot soldiers to take possession. Advertising too is artillery but selling is done person to person. More to the point, successful appliance selling is done house to house.

The return of an adequate supply of appliances have brought some expected reactions. There have been "clearances" and "specials" galore to masquerade price cutting until even the constant shouting of "bargain" does not awaken a glance at the ad, let alone a trip to a store to see it. But whether it is the general avoidance of anything that resembles work, the past easy times, or plain lack of know-how, hard selling is shunned as the solution.

Harder to sell but most desirable load-building appliances, such as ranges, water heaters, are especially suffering from lack of salesmanship. Yet upon the high saturation of such load-builders rests the ability of electric utilities to maintain low rates in the face of increasing costs. In the East this problem has even caused some utility companies to re-enter active merchandising of load-builders with a return to trained sales forces.

FREEDOM rests, and always will, on individual responsibility, individual integrity, individual effort, individual courage and individual religious faith. It does not rest in Washington. It rests with you and me. Two things you and I can do, and two only. First, we can practice what we profess. Second, we can each preach, from our own personal pulpit, the principles we practice, whether that pulpit looks out upon a continent, a country town or a single cottage. As we thus prove our faith by our works, as we accept with diligence and devotion the responsibility for areas within our reach—as we inspire those about us and send them in turn to inspire others—we shall find that we are making an ever-increasing contribution to the accomplishment of our century's most challenging job. Over and above all else we shall find—you and I individually—that ours have become unconquerable souls. — Ed Lipscomb, president, Public Relations Society of America.



Top: Highway 40 before the rotaries failed. Bottom: Ice Coating was 12 in. in diameter on 12-kv conductors at Carpenter Flat, altitude 3,500 ft. Right: 12-kv switches at Tamarack substation after snow had been dug away from OCB. Fence is 25 ft. high

STORM—1952 Version

Harry S. Furlong

Commercial Manager, Drum Division
Pacific Gas and Electric Co.

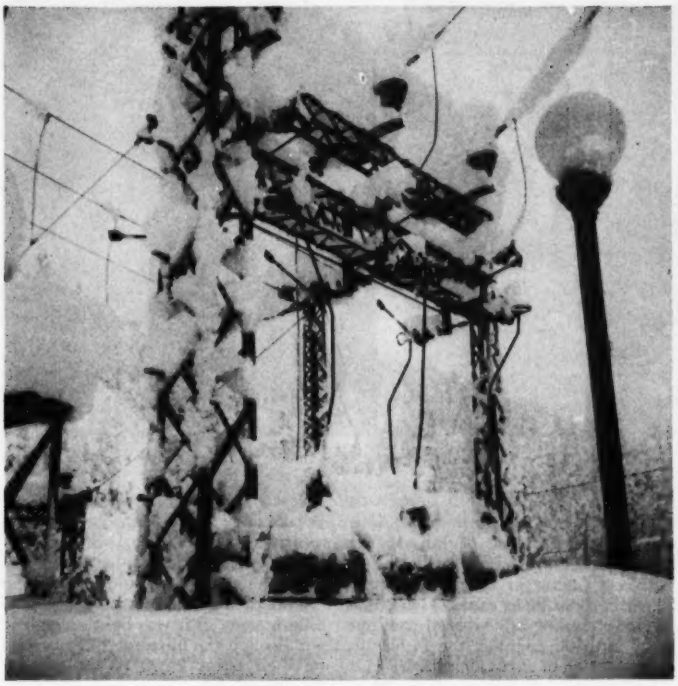
When George R. Stewart's novel *Storm* appeared in 1941 it became a nation-wide best seller within a few weeks. It introduced a different style of dramatic sequence in that there was no hero or heroine except the storm itself and its effect on the lives of a lot of people. Christened Maria by a young meteorologist in the Weather Bureau (as has long been the custom of meteorologists) Professor Stewart's *Storm* spread death, suffering and destruction very much as did the great storm of January 1952.

In the novel, Maria hit hardest and heaviest in the region converging at Donner Summit. She closed Highway 40—for a few days. She raised havoc with telephone and with electric power. She stopped the Streamliner for an hour or two due to a flash flood. Dramatic and powerful as is Stewart's *Storm,* Maria was a sissy compared to the storm that was born somewhere east of the Japan Coast shortly after the New Year 1952 and moved swiftly across cold Bering Sea toward Alaska. Then suddenly it veered southward over British Columbia, Washington and Oregon to northern California. Perhaps the 1952 storm was also given a name by someone in the Weather Bureau. Probably many of the men who fought it to keep the highway and the railroad open, to keep the telephone working and the power flowing over transmission lines had a name for it—a fine old one-syllable word of five letters meaning a female canine.

A sort of prologue to the big storm began on Jan. 4 and 5 when a very wet snow fell as low as the 1,000-ft contour, loading down trees until they contacted power lines, causing interruption of electric service in Auburn and the lower foothill territory where snow seldom falls. Alternate rain and snow continued through the following week with minor damage.

But on Friday, Jan. 11, the new storm came crashing against the California Coast to shake the Golden Gate bridge with a 75-mile gale and roared across the valley to strike the foothills and the mountains, toppling trees, snapping power poles and demolishing structures. And with the wind came the rain that turned to snow not far above the 1,000-ft contour, and the battle between the snow plow and the elements began, to be finally chalked up as a loss for the plow.

When the storm hit Donner Summit the snow gage at Norden read 126 in. Throughout all that day and night and the next day and the next the snow fell, driven before a howling gale that piled up drifts to unbelievable depths. At the little weather sta-



Scenes at Drum power house near Colfax in Placer County. In these pictures, taken Jan. 18 in the 60-kv switchyard, PG and E workers are shown, above, replacing insulator and, below, as they cleared snow from around circuit breakers, shown left blanketed

tion, anchored by cables atop Donner Pass, the wind gage, capable of registering velocities up to 100 mph, "hit the bumper" and the Norden snow gage recorded over 17 ft on Monday morning.

Meanwhile the army of men whose duty it is to keep the highway and the railway open and the phones working and the electric current flowing headed out into the blizzard to give battle. There is a sort of camaraderie, more or less unspoken, among these mountain men. Highway, rails, power lines and telephone, they fight to keep open that the millions down in the lowlands may enjoy their accustomed conveniences. They're a tough breed, these men, and dependent on their own resources. They have to be—to survive.

This is not the story recounting all the line failures and subsequent restoration of service, of canals filled with snow, of failures of generators at critical times. There is neither time nor space to record all the struggles, hardships and disappointments that went with the Big Storm.

Trees were down by the hundreds. They fell indiscriminately across power lines, telephone lines, canals, flumes, roads and trails. Landslides took out sections of flume and ditch. One power house shut down and was still shut down in February because the canal that supplied it was filled with snow. Above 5,000 ft the snow was powderlight and dry, covering telephone and even some distribution circuits in tremendous drifts. Below 5,000 ft it was heavy, wet and sticky. Sometimes the conductors built up to a diameter of 15 in. and broke or pulled a crossarm down. The trees became so loaded with the sticky mass they leaned across the line and either shorted it out without falling, or fell and took the poles down with them.

Still the storm raged and the snow kept falling. One by one in the more isolated mountain communities the power went off—Sierra City, Washington, Downieville, Comptonville and Alleghany. Georgetown and Foresthill were out intermittently as were Dutch Flat, Gold Run and Alta. But these mountain people know what a real snow storm is and, instead of complaints, cheers were in order for the job our tired crews performed in restoring service.

To repeat, this is not the story of the Big Storm. Everybody was too busy to take notes on the things that happened. There was only one objective—to restore service in the shortest time possible. But lots of things did happen and from the routine reports a few may be recounted.

On Lowell Hill Ridge

Between Bear River and Steephollow is the ridge that takes its name from a town that no longer exists. Along the top of the ridge extend twin transmission lines that carry the power from Drum power house to the lowlands. To get up there you leave Highway 40 at Glen Alder and travel the Red Dog road up over the Camel Hump. On a summer day it is a pleasant drive and in less than an hour you may turn off at Mule Springs for a cool drink. (Mule Springs was headquarters for the expedition to rescue the Donner Party back in 1846.) When both tower lines went out in the Big Storm it took 53 hours with bulldozers to open the road as far as Levee's cabin, which is about 20 miles from Glen Alder. From here a general construction crew under Foreman J. O. Gearhart proceeded on web snowshoes to patrol the line. One of the men reported that "we worked 29 hours, then got five hours sleep, then 24 hours with some cat naps. It took

Sno-Cat drops to cleared road. Among the crew here are Jay Gold, extreme right, next to him, Charley Swing and Roy Claytor

us nine hours to make the last four miles." He forgot to add that during the 29-hour trek there was only one cold meal and the sleep was on the floor of a mine shack in Steephollow. But they found the breaks and they spliced them and finally both lines were back in service. Then 22 men tried to find a place to sleep on the floor or on tables or chairs in Levee's small cabin. But food was coming in from Colfax by then and they had a steak dinner.

Operation Rescue

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So the next morning Foreman Pat Shepherd and his crew left Downieville as soon as it was light enough to see through the blizzard. They carried on their backs 2,200 ft (214 lb) of No. 2 steel-core aluminum cable, rope, hand lines, blocks and their tools. The snow froze as it drove in their faces as they struggled over the tops of three ridges into Slug Canyon. In the summer it's not easy going but you can make it (without gear) in about an hour and a half. But Pat's crew didn't get there until two o'clock in the afternoon.

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ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Brakes hold

New house construction had two bad months, January and February, as both weather and restrictions chilled off prospective customers. The materials seemed to be in better supply than the ambition to build. Even wire used in home construction seemed to be available with few exceptions. Unemployment of house wiring electricians was reported on the increase. Spring weather may bring the customary seasonal upsurge. Politics may also release materials and credit as the year draws closer to elections.

Follow leader

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Sno-Cat drops to cleared road. Among the crew here are Jay Gold, extreme right, next to him, Charley Swing and Roy Claytor

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Second course

Estimating for Profits is the title of the second course of educational material by National Electrical Contractors Assn., which is now available either for group study, correspondence courses or by individual correspondence. The accounting and business practice course was the first to be issued by the NECA department of research and education headed by ex-Westerner E. R. Cornish. Classes were set up by the Northern California Chapter, the Los Angeles Chapter, the Oregon-Columbia Chapter, some of which have been completed, others still running. The estimating course is an outgrowth of a lecture and correspondence course Cornish himself developed when Western field director.

Profit taking

Contractors who have done work for the government started receiving forms to file a contractors report for the Renegotiation Board. This means prime contractors who did over $250,000 worth of work during the year or subcontractors who did over $25,000 worth. A contractor selling to any of the government departments or a wholesaler selling to them is a contractor under the act, and a wholesaler selling material to an electrical contractor doing a government job is a subcontractor. While the forms were originally to have been filed and sent in prior to March 1, delay in mailing them has extended the time to May 1, 1952 for 1951 renegotiations.

Hardships

Small business (manufacturers) who face shutdowns because of low allotments under the CMP system and an inability to obtain defense work now have recourse to a Small Business Hardship Account of controlled materials that has been set up in NPA. It is to assist over the second quarter where need can be establishd. A guide sheet is available.

New job

Floyd Nardella, an inspector for the Los Angeles Building & Safety Dept., has been appointed electricity instructor for the Frank Wiggins Trade school, the technical training high school of that city.

New name

Argo Electric Supply Co. is the new name of what used to be J-Z Wholesale Electric. Located at 2665 E. Slauson Ave., Los Angeles, it is run by C. O. Armstrong, George A. Hardman, Hugo D. Deardorf and Gavin S. Malette.

Special wires

Sequoia Process Corp. is developing into an active supplier of JAN-C 76 specification wire, twisted pair TF and TFF, in sizes 16 through 24. Located at 894 Douglas Ave., Redwood City, it has installed new machines to make nylon jacketed wires. Eichorn & Melchior, representatives, say deliveries are good.

All union electrical

Raymond 'Red' A. Young, old time lineman who for the past few years was business manager of IBEW Local 441, Santa Ana, died in February of bad heart. Even the minister who handled the funeral was an electrician.

Experts

Planned Productive Maintenance is to be the theme of the first technical conference of Electrical Maintenance Engineers Assn. of So. Calif. in conjunction with its 6th annual Industrial Electrical Show in Culver City, Mar. 20-22. On the program are—Charles Blakely, Smoot-Holman Co.; Foster Sampson, consulting engineer; Charles R. Long, Westinghouse Lamp Co.; M. A. Wise, General Petroleum Corp.; A. I. Garey, U. S. Electrical Motors; E. H. Fincher, Westinghouse Electric Corp.; Donald Carson, General Electric Co.; John G. Carrin, Pennsylvania Transformer Co.; Charles Croft, Square D Co.; L. F. Cudlin, General Electric Co.; and W. R. L'Hommedieu, ITE Circuit Breaker Co. Joseph St. Andre, electrical editor, Factory Management & Maintenance, New York will address the banquet on "The Electrical Engineer in the Plant of the Future."

New officers

V. Rolfe, electrical inspector for Vancouver, is new president of the Independent Electrical Inspectors Assn. of B. C., succeeding L. E. Ryan, also of Vancouver. J. R. Low of Vancouver is vice-president; J. R. Walker, Provincial electrical department, is treasurer and Richard Hall, secretary of Electric Service League, is secretary.

Protector

Cadmium supply has improved so that M-19, the cadmium order, is to be eased to permit much more extensive use. Zinc and lead however are still short. The cadmium situation may ease this a little.

Hot spot

The Wage Stabilization Board named Irving Bernstein, research associate of Institute of Industrial Relations, University of Calif., chairman of the WSB for California, Arizona and Nevada, succeeding Arthur Ross.

Moves

Los Angeles' Construction Industries Exposition will have its home show at Hollywood Park in Inglewood, Aug. 22-Sept. 1.

Local talent too

In Victoria the Pacific Northwest Regional Conference of the Illuminating Engineering Society will have some speakers from Canada and the region as well as those announced last issue for the Pacific Southwest region. Beverly A. Travis, Seattle consulting engineer, will speak on "Standardization of Fixture Design"; John M. Chorlton of Toronto, on "School Lighting in Eastern Canada"; Dorothy McGregor of B. C. Electric Co., "A New Concept in Home Lighting."

Barnstormers

Several of the officers and speakers are making a number of appearances before groups in the West while on tour for the two IES meetings. Sam Hibben, IES president, is to address meetings in San Diego, Los Angeles and other Western cities. Alston Rodgers is booked to present his dramatized "Salute to Lighting Progress" show also.

Second edition

The new edition of the IES Handbook, a 987-page revised edition, is now off the press, with 15% more pages, 75% revision of text, has 657 illustrations and cross indexes 4,500 items. It has 18 sections. . . . Dates for the IES national technical conference in Chicago are to be Sept. 8-12.

Home show

A home lighting and home wiring exhibit will get prominent display at the California International Home Show at Oakland civic auditorium, March 8-16 when the Northern California Chapter, NECA, and Northern California Electrical Bureau combine in showing. A miniature house to scale operates from a remote-switch panel. The exhibit, built by PG and E, will be used in county fairs and exhibits during the year.

Pass on savings

Sylvania has announced reduced prices for its greatly simplified line of industrial lighting fixtures. By developing a standard series of parts, some 34 different models with eight mounting methods are made availabl to the contractor to fit most any industrial application.

Expert's book

Prentice-Hall Inc., publishers, announce a new lighting book, "Introduction to Lighting," written by former president of IES, Howard M. Sharp. Sharp visited IES chapters and sections in the West during his year as president and at the San Francisco convention. He was formerly illuminating engineer for Niagara Hudson Co., Buffalo.

Chew the rag

Whether garbage disposal units should be grounded or not is a debated subject because in the National Electrical Code grounding is not required where one is connected by means of flexible cord. However according to California Electrical Safety Orders grounding is required, and some local ordinances also require it. Connection to the sink or drain is not considered as providing a permanent or effective ground, Frank Short, consulting engineer, points out in one of his bulletins.

Caravan

Arizona Chapter of IAEI had an unusual program in January at Casa Grande. Merle Plummer of Los Angeles Department of Water & Power, accompanied by five representatives of manufacturers of service entrance equipment, presented a demonstration of the recently adopted service standards as developed by California and Nevada utilities. Some 50 attended.

Reflector mercuries

Two new mercury lamp developments are announced by General Electric Co. Both are 400-w mercury lamps for industrial applications but for the first time are in a silvered-reflector type of bulb that guarantees long dirt-free reflector life. One is a straight mercury type but the other has phosphorous on its face, which gives some color correction for use where a more normal complexion appearance is desirable.

Certify cold cathodes

The Fluorescent Lighting Assn., which is made up of cold cathode equipment manufacturers, has announced the inauguration of a FLA certified quality control program for lamps. Rigid standards have been set up and an independent testing laboratory will certify the products and label the lamps. Failure to live up to the standards will bring withdrawal of the label. Two voltage ratings will be designated LP for 750 v operation, and HP for 835 v or greater.

Farm advice

University of Idaho college of agriculture in cooperation with the Farm Electrification Committee treats of adequate interior wiring for the farm in one of its leaflets of instruction, which go to 40,000 farm users of electricity in that state. As are the preceding leaflets, it is illustrated and gives a concise summary of the vital information.

Moved

Earl J. Hoff, popular Graybar manager in Butte, has been transferred to Dallas, Tex., as manager of outside construction sales. Hoff was formerly from Tacoma and Seattle. R. J. Carlson succeeds him at the Butte Graybar house.

Not far away

May 6-9 at Cleveland Auditorium are the dates for the fourth International Lighting Exposition and conference, sponsored by the industrial and commercial lighting equipment section of NEMA. Local regional attendance committee members who are drumming up Western attendance are: C. D. Belt of Denver; Leonard Hobbs, Los Angeles; William Bennedorf, Phoenix; Les M. Baxter, Portland; Mark Bryner, Salt Lake City; Matt Cabot, San Francisco, and Walter Toly, Spokane.

Electronic show

Long Beach will be host to the Western Electronic Show and convention of IRE, Aug. 27-29. The show will be held at the Long Beach Municipal Auditorium. An office for the show has been set up at 215 American Ave.

Know-how

National Assn. of Electrical Distributors recently appointed a hotel man to its staff to make convention hotel arrangements for it.

Each learn

Joint meeting with the East Bay Chapter of American Institute of Architects proved to be profitable for the architects as well as the Northern California Chapter NECA, Feb. 14, in Oakland. A total of 76 architects and contractor representatives attended and heard Herb Bowen speak on electrical specifications for residential and small commercial jobs, Steve Lindheim on industrial jobs. George Simonds of AIA spoke of the AIA recommended bidding procedure. Harry Bruno told of a deferred project plan for Alameda County. It was decided unanimously to make such a joint meeting an annual affair.

Mutual relations

Rocky Mountain Chapter of NECA's annual banquet for the electric utilities and materials suppliers drew 180 leaders of the industry. Gaylord B. Buck, commercial vice-president of Public Service of Colorado, told the group there was a growing place for electrical contractors in the construction programs of the utility companies. Ralph Johnson, District 8 NECA vice-president, presented a trade policy report in which it was suggested the 10 to 20% restocking charge for stable merchandise be scrapped, as the function of supply houses is one of making materials and supplies available; that of contractors of installing it.

Hot issue

Public indignation over the ban on electric heating installation in Las Vegas, Nev., mounted to a fever pitch late in February as a "People's Committee" headed by N. M. Austin, an electrical contractor, started full-page newspaper ads denouncing the "power trust" and calling upon the governor and the public utilities commission to review its former ruling permitting Southern Nevada Power Co. to deny service for any more electric heating installations. They like electric heat in Vegas!

Progress

Regular ads over the name of the Electrical Contractors Division of the Bureau of Home Appliances of San Diego County are running in city and county newspapers and the course on fundamentals of salesmanship for electrical contractors has begun under Dan Turner. Meanwhile many exhibitors have been signed up to display home wiring and lighting equipment at the Spring Fair of Modern Home Ideas, April 15-20, in the Electric Building, Balboa Park. These exhibits will feature residential and commercial lighting, lamps, heating, ventilating, signal, intercom equipment, chimes, built-in electric cooking, and adequate wiring.

Legislative powwow

Electrical groups in Washington State plan a meeting at the Chinook Hotel, Yakima, March 28-30 to discuss electrical legislation to be proposed at the next session of legislature. John B. Majerus, manager, Puget Sound Chapter, NECA, has been named temporary chairman, assisted by John Watts, Seattle Building Department. The plan is an outgrowth of a suggestion made by T. Ralph Neilsen, executive secretary of the Electrical Contractors Society of Washington, at a Puget Sound Chapter, IAEI, meeting at Everett, last year. A later meeting in Seattle resulted in the appointment of Majerus to forward the plan.

Logan winner

Logan, Utah, is one of the places to have a 1952 light conditioned house under the national plan of the General Electric Co. Lamp Division. Builder is to be the Cache Valley Builders Supply Co. Calvin R. Watts received a winner's certificate from Louis Hruby of G-E Lamp, at the National Home Builder convention in Chicago.

Color mix

Spectro-Lite is the name given by the John P. Filbert Co. Inc. lighting division, of 2007 S. Vermont, Los Angeles, to a system of combining blue, red and white fluorescent lamps in a special fixture to mix and diffuse the colors in order to get a white light of approximately 6,000 K color temperature. The units are made up in commercial units and in portable units for color matching on the counter.

G. Fitzgerald defrosts the Kelvinator . . . while Hotpoint's hostess Beverley McCormick and Sarah O'Reilly were electronic at the

First "Normal" Market Since the War

As anyone who has seen the market weeks through the war, prewar and postwar years will attest, the last market week at San Francisco Merchandise Mart, Feb. 4-8, was more like prewar than any since. From the feverish clamor to find any merchandise at all to sell during the war to the last summer market's almost total lack of interest, the recent one was back to business again in a quiet, steady sort of way. The same report came from those who attended the Chicago and Los Angeles markets.

Electrically there was little of startling newness. Most lines boasted of improvements and changes but few were sensational. L&H ranges joined Thermador and Presteline in showing a new separate oven, separate cooking unit, built-in type of electric range. Two gas ranges also feature this now. L&H also showed a new 30-in.-wide range.

Welbilt of Maspeth, L. I., sprang a new electric gimmick for its gas range—an electric broiler in one oven, to operate on 110 v. This company, which showed for the first time in this market, started an electric range line of four models last year, said L. D. Ford, its representative. Washington Stove Works of Seattle came into the market with its Majestic line of ranges, combining wood or coal and electric.

A peek into the future was given by Hotpoint as it showed a special model of an electronic cooking device from which a pretty Miss McCormick served hot dogs cooked in seconds. But there are none for sale as yet.

Haecker Wilson

Former Westerner A. C. Scott, now sales vice-president of Apex, came to see dealer reaction to the new Apex automatic washer and the little dishwasher that heats its own hot water. He and Lou Stull, district manager, found plenty of interest in both the Fiberglas tubs and the balancing that requires no floor fixing.

Frigidaire reserved its new refrigerator features, the rolling shelves and defrosting system which it calls Cyclamatic, for a big dealer meeting in Oakland during market week. But all makes of refrigerators shown either at the Mart or at recent product showings featured shelves in the door and some kind of automatic defrosting.

Television sets all seemed to go to the big tubes as the center of sales attraction. Even portables and table models use the biggest tube they can crowd into the veneer case. Prices reflected the slump in TV sales and the ample inventories. In fact practically nothing was on allocation anymore, in spite of all the government chatter about materials shortages. What most manufacturers and distributors seemed to be most concerned with was selling.

This was apparent at the press luncheon Feb. 4, at which George L'Amoreaux, Mart manager of promotion, presided and called upon men from the furniture, rug, linoleum and appliance industries for comment. Fred Fenton Jr., Western regional manager for Easy Washing Machine Co., spoke for the appliance industry. He said there was plenty of merchandise around even if there may be shortages in the second quarter which may not even be felt by the public. "Allocation," said he, "is behind us. Price appeals no longer have much effect. What is needed again is intelligent merchandising."

Even the Western Radio-Television and Appliance Trade dinner, Feb. 6,

was more realistic in tone. Bruce Wilson, manager of Thompson-Diggs Co. appliance department, set the tone by his informal chairmanship and frank commendation of the Hotpoint Co., which he does not represent, for its advertisements to dealers on the price cutting question.

Carl V. Haecker, merchandise display manager of RCA-Victor Division, RCA, gave a talk so sparkling with good stories that his excellent advice on selling and demonstration almost became lost in the laughs. But cagily he supplied everyone with his well-organized points printed on a small slip of paper.

As a successful selling capsule, Haecker compounded four ingredients plus one—(1) Aggressive planning to coordinate the thinking; (2) aggressive advertising to bring people to the store; (3) aggressive window display to bring people into the store; (4) point of purchase arrangements and facilities; plus sales power in demonstration to tell, show, illustrate, demonstrate.

"Somebody has to push the button, turn the dial, raise the lever, lift the bale. The last three feet, when the merchandise, the customer and the money are together at the same time, are the most important in the whole process of selling."

Good sound business advice came at the close of the dinner from James E. Holbrook, vice-president, Pabco Products Inc., Oakland, who spoke on "How to Do Business in a Controlled Economy." He summarized that, "We are not in position to worry about income tax—There will be usable good merchandise available to sell without apology for it—The standard of living is not going down and people have lots of money—Training of personnel is more important than ever—So is continued advertising, so sell the positive—Contact your government people like humans and we all will get along better."

Westinghouse's metered door opening for defrosting was used in drawing for prizes by visiting dealers. Decorative Pat Dwyer drew winners from among those whose door opening rang the bell . . . John Antich of Watsonville Electric found the entire Savasta clan (T.J., Carl, T.R. and M.J.), and Al Lindemann, proudly showing the new L&H Adapto built-in electric range . . . Lou Stull and A. C. Scott, Apex vice-president, beamed at the interest everyone showed in the vibration control mechanism in the new automatic washer . . . Such scenes were typical of those in all the exhibits at the Mart. Mart management estimated total attendance of over 14,000

ELECTRICAL WEST Sales Guide

News Letter

March 1952

FOR THE ELECTRICAL MERCHANT OF THE WEST

When a dealer advertises by radio that he'll throw in a TV set with each refrigerator, plus a big trade-in allowance, it's hard to believe there's any shortage of appliances, either now or soon. Said he needs warehouse space. Needs something! So does this business. It can't be reading the NPA publicity. With such competitive conditions OPS might as well fold up and save taxpayers all those salaries, too.

Crazy business

Fair Trade legislation went several rounds with two different congressional committees during the month, with the Dept. of Justice and the FTC in one corner and dealers' associations and manufacturers in the other. There are two different bills under consideration. Both would restore the nonsigner adherence to a Fair Trade contract. Testimony showed that since prices broke nobody has been selling any table appliances. Why should they try if the profit is all cut out by loss leader chains and big stores? And their volume doesn't make up for the thousands of others who formerly promoted and sold.

Fair trade embattled

To try to salvage something from the wreck Proctor authorized, indeed it is promoting, a program urging dealers to offer its $16.95 toaster at "specials" down to as low as $12.98 in an effort to get them back some appliance business. Advertising will carry the $16.95 list and dealers can realize 33% if they "special" it at $13.95, less if they have to cut to $12.98. The so-called Proctor Partnership Plan readjusts margins for distributor and dealer and is aimed to restore selling up to the top of the line models.

Will it work?

Sunbeam, however, is fighting the thing through. In addition to its two suits, one against Macy's, the other the Payless chain, the Department of Justice is suing Sunbeam in a test case to cancel its form of contract or find out if the Supreme Court upholds such contracts. Interesting sidelight is that U. S. Dept. of Commerce has issued a statement upholding Fair Trade as necessary to preserve small business.

Champion attacked

British Columbia is experiencing a price war on appliances now too. It is expressed in intensive trade-in allowances on even old brooms and wash boilers and in advertising boasts that no one will undersell the price cutter.

Same old line

Most spectacular salesmen's contest tour of the year was General Electric's shipping of 2,000 Western sales winners East and 2,000 Eastern ones West for a week of entertainment, sightseeing and fun. The Easterners, led by Mike Sweeney, took over San Francisco, Feb. 19-22.

Biggest tour

Food plans tied in with a freezer sale have sprung up like mushrooms lately to the extent of becoming something of a racket. Some are legitimate but many are just riding the fad until it begins to sag and will leave consumers stranded and plenty sore at the appliance industry. Reliable dealers, to protect their own business, should work with Better Business Bureaus to screen out the phonies.

New bonanza

Some major changes in distribution during the past month. Leo J. Meyberg Co. gave up the Norge line and Coast Electric in San Diego; Sues, Young & Brown in Los Angeles, Thompson-Holmes in San Francisco took it on. . Sues, Young & Brown, long a Proctor distributor, gave that line up last month. . Household Products Co. of Oakland, for 15 years Servel and Estate Ranges distributor, discontinued appliances and W. J. Lancaster Co. took over both lines for northern California. Lancaster handles Thor and Motorola. . Sylvania TV went to Gough Industries. . Whirlpool laundry equipment is back at Graybar in San Diego. . Youngstown Kitchens is distributed there by Distributors Inc. . Lee Distributing has James Dishwashers. . San Diego Imperial Supply Co. will handle Apex washers and dishwashers. . Gold E Distributors Inc. takes on the Capehart line in San Diego. . Hoffman distributorship in San Diego is now known as San Diego Appliance Distributors Inc. with Walter Harvey as president. In San Francisco, Hoffman put Richard Scott in as general manager and Byron Brown as sales manager. . George A. Gillespie became a Packard-Bell distributor for the San Jose territory and General Mills Inc. appointed Ed M. Schindeldecker as Pacific southwestern district manager in his place. Fred Barker, formerly with Frank Edwards, has joined O. B. Wilt Co., Monarch and Presteline representatives.

Try to keep up

No sooner is one Market over than dates spring up for the next. The Chicago spring and summer dates are June 16-26. Seattle Fall Market dates are set for June 23-27. Los Angeles Market will be July 7-11. San Francisco Western Summer Market dates are July 14-18. The Los Angeles Trade Fair group announces the California Lamp and Drapery show July 6-10, gift show July 20-25, jewelry Aug. 17-20 and Western Housewares show on Sept. 14-17.

Next markets

California Electric Service Inc. is taking over the entire second floor of its building at 168 First St., San Francisco, to accommodate the trade and public as additional parts distributors for General Electric small appliances and as factory authorized service station for Universal electric housewares and vacuum cleaners. Its Long Beach branch is likewise expanding into the store next to it, according to Garth Chamblin.

Expands service

The 1952 edition of the National Appliance Trade-in Guide, published at 2132 Fordem Ave., Madison, Wis., is now off the press, at $5 per copy. Now covers 9,000 models of 78 manufacturers of refrigerators, electric ranges, gas ranges, vacuum cleaners, washers, freezers.

Trade-in guide

Robert Dewalt did such a bang-up job as Western region manager for Proctor Electric that he was promoted to sales manager for distributor sales by Walter Schwartz Jr., Proctor president, and goes East.

Reward

Ray Jones Washing Machine Co. of Denver, repair parts wholesaler, calls the attention of all washing machine repairmen to the Reference Manual of Washing Machines Parts and Supplies prepared by well-experienced Harry Markow of St. Louis. It took fully two years to assemble the wealth of data and cross reference in its 500 pages. It not only lists parts but illustrates them and gives dimensions and where they may be

Repair boon

used in other makes in emergencies. Parts jobbers Ray Jones in Denver, A-1 Master Electric in Salt Lake City and Washing Machine Parts Co. in Los Angeles have copies at $5.

Scanning TV again

Television sales were still in the valley in Los Angeles, San Diego, San Francisco, Seattle and Salt Lake City and most opinion was that it was a seasonal slump that would pass with spring, big events in politics, sports and, it was hoped, the unfreeze of some more TV channels. Radio-TV manufacturers after scanning their supplies of materials, felt certain they could supply broadcasting equipment for any stations licensed this year.

Government obstacles

Politically the kettle brewed too. Wayne Coy resigned as chairman of FCC and showed up in Albuquerque as agent for Time Inc., to buy the local independent station that he may run as manager. Paul A. Walker was made chairman in his place and Robert T. Bartley added to the commission by President Truman. Lots of speculation as to what these changes will do to the freeze and also to color TV review. . Paradoxically as RTMA's compatible color standards committee is ready for some field tests the Dept. of Justice threatens antitrust suit against RTMA with charges it conspired to hold back color TV and FM. DuMont Laboratories staged a demonstration of UHF for IRE, showing a VHF-UHF teleset, a new UHF converter and a new UHF Diplexer. Also showed how TV can be used to control railroad yard traffic remotely, and described a new Selfocus tube that eliminated external focus coils.

TV centers

King Broadcasting Co. of Seattle is building a TV center for KING-TV at 320 Aurora Ave. And in Los Angeles CBS is building a new TV city with novel movable wall construction, on the site of the old Gilmore baseball stadium.

Larger faces

Showings of new models were too numerous for complete mention during the past month, with the trend being strong to 17 and 21 in. size tubes, and many 24 in. Some trouble has been reported from 24-in. tubes however and there is caution in going to this size too quickly. Prices were generally lower, and in Los Angeles some dumping of Teletone 21-in. sets at $148 was reported.

New idea

Hoffman Radio announced a new triple parts warranty. It includes the excise tax in the retail price to allow dealers full profit; the parts warranty is a separate item, also carrying a margin of profit, and the consumer gets a full one-year warranty on picture tube and parts.

Triple company

Kierulff & Co. now is two separate stores and three companies. The general office and warehouse is at 6058 Walker Ave., Maywood, 7 miles from downtown Los Angeles and the Kierulff Electronics Inc. and Kierulff Sound Corp. keeps the 820 W. Olympic Blvd. location. The Electronics company is one of the West's largest industrial electronics jobbers. The Sound company specializes in high fidelity audio, recording and intercom systems and master antenna systems.

Radio carries on

Radio is far from defunct and the major makers showed 1952 models of portables, table models, consoles and combinations in recent weeks. Zenith held a distributor meeting in San Francisco Feb. 19, showing some 10 clock radios, three portables, two table radio-phonos. . Motorola introduced 20 sets in its home line, clock radios, and a new line of car radios, all with price reductions. . Emerson announced some new small radios in many colors. . Motorola has trademarked the name Handie-Talkie for its portable 2-way radiophone that weighs only 10 lb.

Gift opportunities

Customary spring campaign on electric housewares is being readied by the Electric Housewares Section of NEMA, with posters, plan books, advertising pieces in a 72-piece display kit for $3.95. The slogan is "Give Electrical Housewares--first choice for every gift occasion."

Prepare to sell

Doing something about it is the Bureau of Home Appliances of San Diego, which starts a Modern Traffic Appliance Clinic on March 11, for four sessions at the Electric Building, under joint sponsorship of the Bureau, San Diego Gas & Electric Co. and San Diego Vocational School. Six leading appliance manufacturers' representatives will give sales instruction: Joe Burns of Telechron, Paul Bradner of Westinghouse, Ben Davis of General Electric, Jerry Parshalle of Sunbeam, Bud Green of Toastmaster, Jack Booth of Proctor. Dan Turner, instructor, and Al Jewell of Graybar will also participate.

New life begins

The newly reorganized Inland Empire Electrical League held its first big meeting at the Desert Hotel, Spokane, March 5. Frank Tool reported on how other leagues are operated and the organization committee headed by V. E. McCain of Graybar outlined the plans for carrying it on as a sales promotion and fellowship organization.

Year's quota

Northern California Electric Bureau's program for 1952 starts with an Electrical Living Month campaign in May tied around the Better Meals at Lower Cost book recently prepared by the home economics department of PG and E. There will also be 29 rural electric cooking schools in the area, exhibits at 14 or more county fairs; a television promotion whenever it is thought timely; five or more model homes; two or more model classrooms lighted and the Christmas lighting program. An automatic clothes dryer promotion was getting results in February-March.

Distributor information

Other distributor news includes the appointment of three Philco distributors outside of Los Angeles where the new Philco-Los Angeles branch does not cover. One in Long Beach will be The Progress Co.; in San Bernardino it is Greater Counties Co.; in Santa Barbara it is Coast Counties Distribution Co. . Hargrove-Green is now representative in southern California for Presteline built-in electric ranges. . True's Distribution Co. of Spokane moved into a new building at N 730 Hamilton St. . Parker Co. of Denver has a new place at 4655 E. Colorado Blvd. . John F. Conger was made southwest sales region manager for Capehart-Farnsworth succeeding W. H. Rinkenbach, now assistant to C. R. Ward, West Coast manager. . Majestic Distributors of California has been set up by Wilcox-Gay with Louis Stutz as head.

Straw in wind

Sylvania Electric Products international division is said to be ready to start distributing a complete line of major home appliances overseas. It may be a test before domestic distribution is tried.

Out of lamps

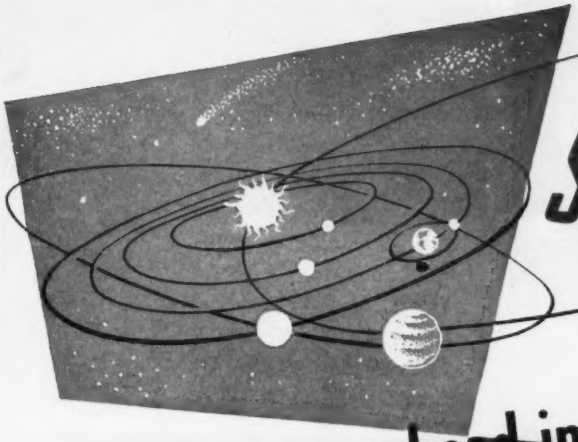
Mitchell Mfg. Co. of Chicago has sold its entire floor and table lamp division to Standard Novelty & Lamp Co. It includes all molds, designs, etc., for lamps and residential lighting novelties. Standard will merchandise under the trademark Stnola.

Modern styles

Lightolier has announced a large assortment of new lamps in Bristol glass, a Young Moderns series in wrought iron and Aspenslat, and a collection designed by Isamu Noguchi in a Sculpture With Light modern styling in two classifications, one at prices under $25.

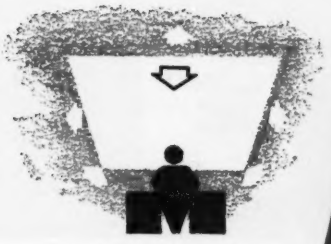
Tells it well

A new sound slide film in color dedicated to light conditioning in the home has been announced by the Lamp Division of General Electric. It is titled, "New Light on your Favorite Subject."

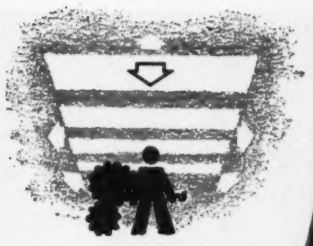


Smithcraft

"a light year ahead in the development of fluorescent fixtures"



for the office . . . for the store



for the factory

There are two methods, in general, by which the designs of fluorescent fixtures are developed. The leaders in the industry do it by research, know-how and original thinking; the others by imitating the successful designs of the leaders.

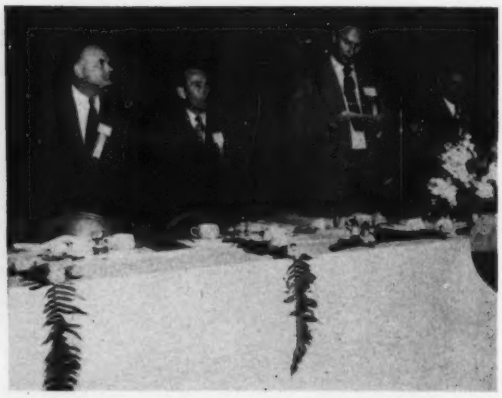
As one of the largest companies in the industry, Smithcraft can — and does — invest heavily in both time and money to create original and progressive lighting fixture designs. This leadership in design, added to Smithcraft's recognized quality of manufacture, has been, and will always be, the reason for Smithcraft's reputation . . . "a light year ahead in the development of fluorescent fixtures."

Two current Smithcraft developments are: Area Illumination, a lighting "fixture" of limitless dimensions and choice of shielding media; and Industrial Lighting, which brings to the factory higher levels of illumination with greater visual comfort. Plan to see these Smithcraft developments at the 4th International Lighting Exposition in Cleveland (March 3-7) or write for preliminary information now in preparation.

America's finest fluorescent fixtures . . . Smithcraft

LIGHTING DIVISION

CHELSEA 50, MASSACHUSETTS



San Diego's Bureau speakers Chernof, Tatum and Scaife; and dealer panel of Halverson, Franz, Matthews, Hazie and Wiese

Seen at February Sales Events

February brought out not only the annual market weeks but many major manufacturers' spring showings of 1952 models. During market week itself Frigidaire held its big show at Oakland and International Harvester had one in San Francisco the same day, Feb. 7.

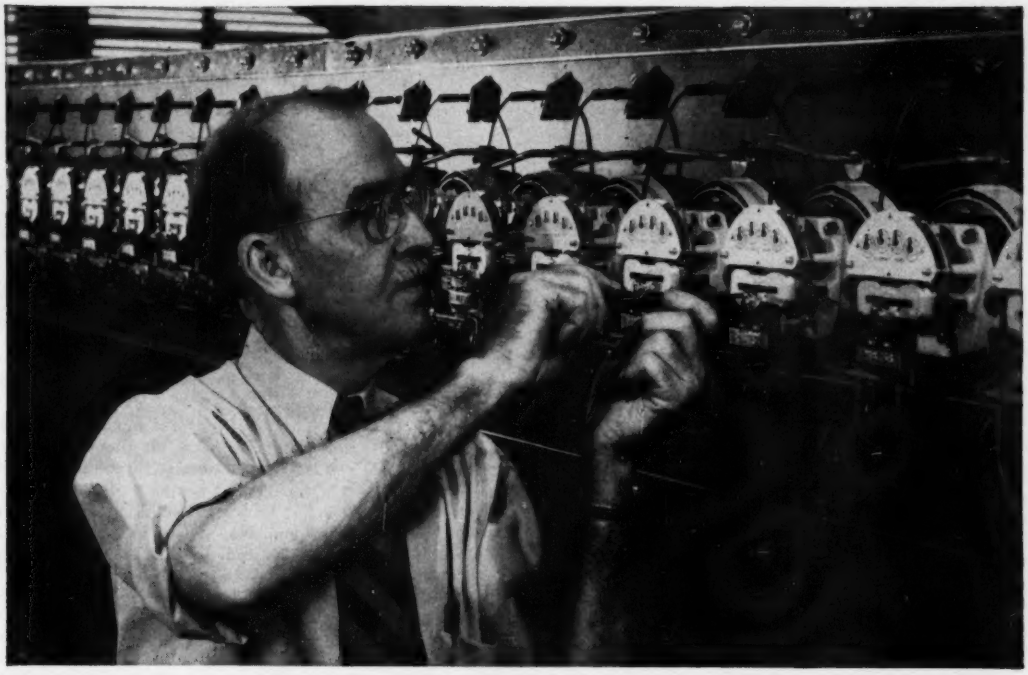
The following week the San Diego Bureau of Home Appliances held its annual winter conference, Feb. 14. As always a rapid fire program packed some 20 participating speakers in an afternoon and evening. Walter E. Eliason, U. S. Dept. of Commerce, and Herman Mangels, Federal Reserve Bank, reviewed the financial and business outlook. That night Donn Tatum, ABC's TV manager, briefed the TV outlook. Dealer panel grappled with current dealer problems and a 12-man manufacturer panel told quickly what new was to be expected in product and promotion. Full detail will be in the next issue.

Frigidaire as always had a top grade show, perfectly staged and timed. W. I. Buchanan, Pacific regional manager, toured it through the West to distribution centers.

Having divested itself of major appliances, Landers, Frary & Clark is putting a million dollars in advertising to introduce a completely new Jet 99 vacuum cleaner, with restricted franchising, fair trade pricing and strong dealer margin. Lee Moss, sales manager, W. J. Cashman, advertising manager, and Frank Barmore made the showing in Denver, Los Angeles, San Francisco and Seattle.

Rolling shelves of Frigidaire's new Cycla-matic refrigerator shown by I. W. Cowles

Fred W. Porter, regional Universal manager; Lee Moss, vacuum cleaner sales manager; Mel Pettis and Les Phillips of Thompson-Holmes, S.F. distributors, admire the Jet 99



Sangamo J Meters

preferred by men who work with meters

Your meter superintendent and his men prefer meters that can be quickly and easily calibrated, saving costly man-hours for his company.

Men who work with meters *know*, that Sangamo J Meters, as received, seldom need any calibration to meet all generally accepted standards of accuracy.

Simple full-load and light-load adjustments—readily accessible from the front, exceptionally clear visibility, and easy removal of registers, are a few of the reasons why J Meters are favorites with meter testers everywhere! They're faster to test—easier to calibrate. An ordinary screwdriver is the only tool needed.

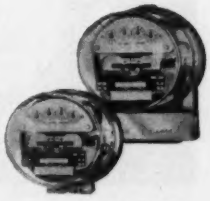
Economical replacement of parts is another of the reasons why the men who work with meters prefer J Meters. When advantageous, either the current or potential element may be replaced separately.

Only Measured Facts are Known Facts

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

8M10-2

Sangamo J Meters have proved their ability to meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.



IAEI Chapter Dates Set

To coincide with a swing through the West by Robert A. Peterson, technical assistant secretary, International Assn. of Electrical Inspectors, a series of chapter annual meetings are being arranged in Montana, Idaho, eastern Washington, Puget Sound, Oregon, California, Nevada, Arizona, New Mexico and Colorado.

As tentatively set up the first meeting would be of the Montana Chapter about April 17-19, followed by Idaho Chapter, April 22 at Hotel Bannock, Pocatello, then with the Eastern Washington Chapter about April 23. A joint meeting of the Puget Sound Chapter and the Oregon Chapter was being planned about May 1 at Longview.

The Northern California Chapter was arranging with the Sacramento Valley Chapter and Central California Chapter for a joint meeting also on May 10, but the Arizona Chapter also had a tentative date then. The Southern California Chapter had May 14 scheduled at Long Beach.

Nevada Chapter has set May 16 at Las Vegas for its date. This will be during spectacular Helldorado week, a Western celebration.

The Utah Chapter date is May 19 in Salt Lake City at the Newhouse Hotel and committees are active on arrangements already. A meeting with the New Mexico Chapter around May 22 and the Rocky Mountain Chapter in Denver about the 26th were also suggested. As the schedule is made firm further announcements will be made.

William Kennedy relinquishes the gavel to Emil Weber, new president of San Francisco Electrical Contractors Assn. On either side are W. J. Varley, manager; Ed Scott, secretary

Dist. 6 NECA at Santa Barbara

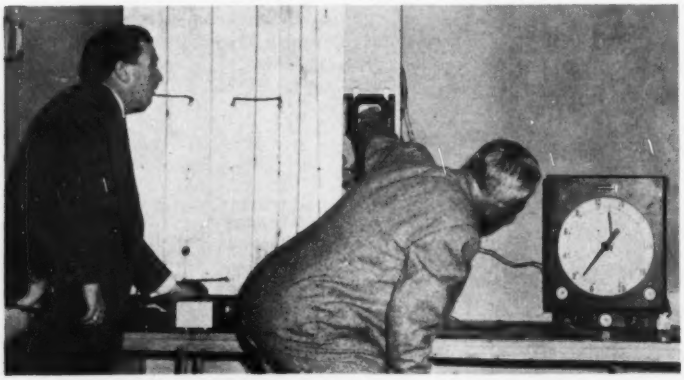
Santa Barbara will be the location for the annual meeting of District 6 National Electrical Contractors Assn., when representatives from chapters in California, Oregon and Washington meet at Mar Monte Hotel, May 9-10. The California Central Coast Chapter, NECA, Santa Barbara, will be host to the national officers and chapter representatives. Will Pregill, chapter manager, is making reservations, according to J. D. O'Connor, vice-president of District 6.

● **After serving as treasurer** for two terms, Emil J. Weber was elected president of the San Francisco Electrical Contractors Assn., succeeding W. T. Kennedy, who served two terms in that office. Rod E. Newman, H. S. Tittle Co. was re-elected vice-president and E. W. Scott, secretary. The new treasurer is L. Roy Moser, who has served on the public relations committee. Directors are the officers and Kennedy, B. J. Doherty, Pat Furlong, Louis Ets-Hokin, E. O. Kleinhans, L. S. Malm and C. D. Lindstrom. W. J. Varley is manager. Annual banquet for new officers is scheduled for April 19.

● **John Bramst,** Niles Electric Co., was elected president of the Northern California Chapter, NECA. Paul Pease, Contra Costa branch chairman was named chapter governor. W. S. Bassett, Conrad Electric, is vice-president and W. A. Cyr, treasurer; T. L. Rosenberg is Alameda County chairman; Art Tockey of Napa Electric Shop is Napa-Solano chairman.

● **Sam Rosch,** entertainingly scientific consulting cable engineer for Anaconda Wire & Cable Co., will address a number of industry meetings in California in late March.

Ralph Brogie, Brown Instrument Co., Clyde Narvez, Richmond inspector, and Cliff Wingate, inspector for Standard Oil refinery, show heat generated in copper, aluminum and iron bare grounding wire carrying full 30-amp fuse rating. Iron wire charred wood



Hot Ground Wires

Mervyn A. Bader, building official for San Mateo, was elected president of the Northern California Chapter, IAEI, at an unusual meeting in Richmond at which a practical test of iron wire for grounding outlet boxes was made. No. 14 and 16 copper, No. 14 aluminum, No. 12 and 6 iron wire were mounted bare on pine boards and 30 amp run continuously through them for 30 minutes. No. 12 iron, suggested for grounding outlet boxes, heated to 570° F. and charred the wood. Thermocouples registered the heat on a sensitive instrument. Bader succeeds Prentice Wilson of Santa Rosa. Clyde Narvez of Richmond was named vice-chairman, Ken Bliss, secretary.

ONE Nichrome

"One World." All over the globe, men have come to acknowledge this unique concept as the most effective basis for solving innumerable problems related to human progress.

"One Nichrome." All over the globe, men have come to acknowledge this unique alloy as the most effective means for solving a host of problems also related to human progress—in the fields of engineering and production.

This being so, we take particular pride in our trademark: NICHROME—granted solely and wholly to us by the United States Patent Office forty-three years ago. Representing a series of superb electrical heating and resistance alloys, developed and produced *only* by Driver-Harris, it symbolizes top quality and utmost dependability to manufacturers everywhere.

**T. M. Registered in United States Patent Office by Driver-Harris Company August, 1908*

World-Famous **Nichrome*** is produced only by

Driver-Harris Company

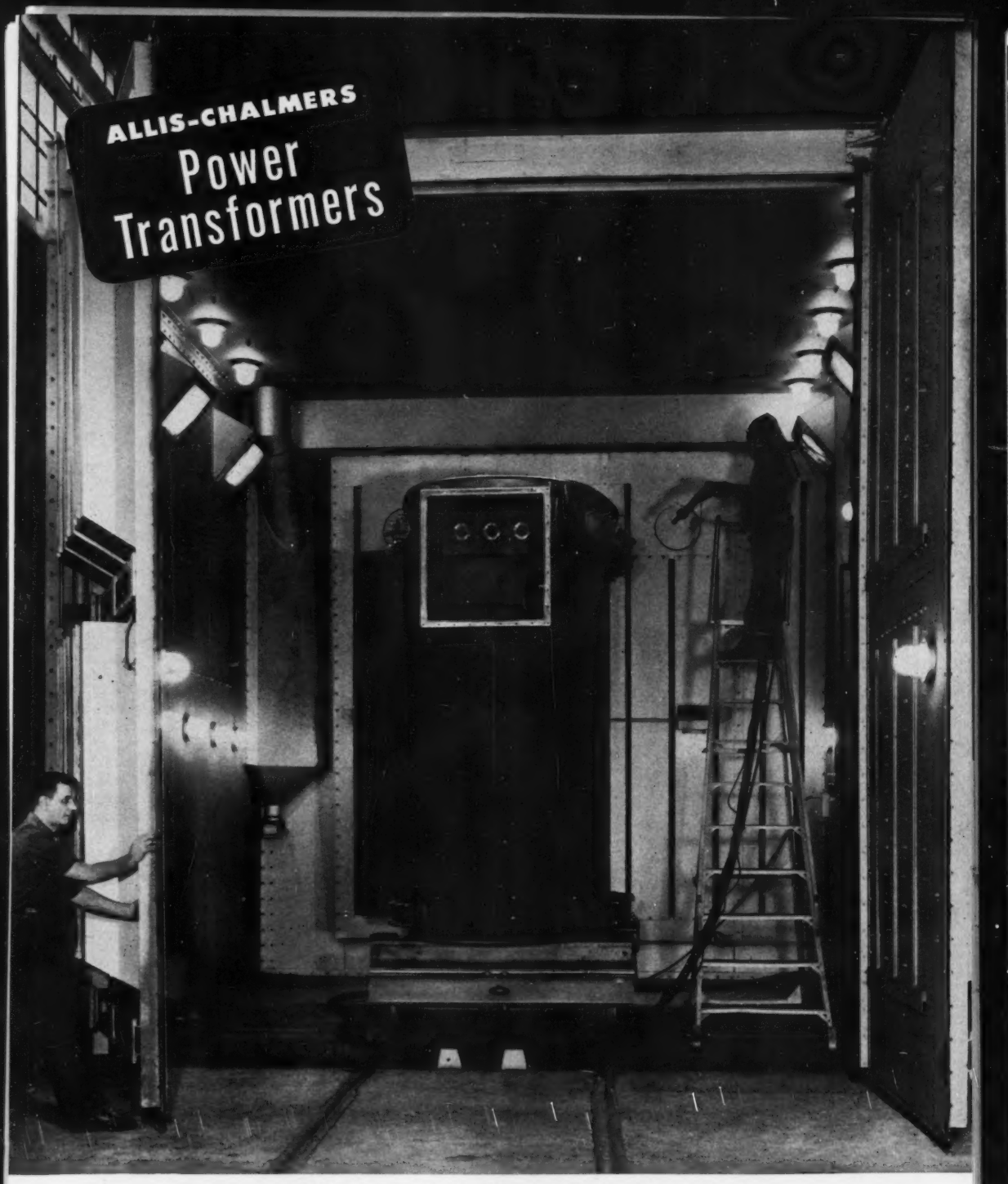
HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

Manufactured and sold in Canada by The B. GREENING WIRE COMPANY, LTD., Hamilton, Ontario, Canada

Factories: U. S. A., CANADA, ENGLAND, IRELAND, FRANCE, ITALY, SPAIN Representatives in 38 COUNTRIES

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD



CORROSION RESISTANT FINISH. Tanks are shot blasted in this booth to prepare their surfaces for painting. Three coats of paint provide a tough, corrosion-resistant finish. Radiators have a high quality protective coating that is the result of dip-Bonderizing and rotary flow painting.

ALLIS-CHALMERS

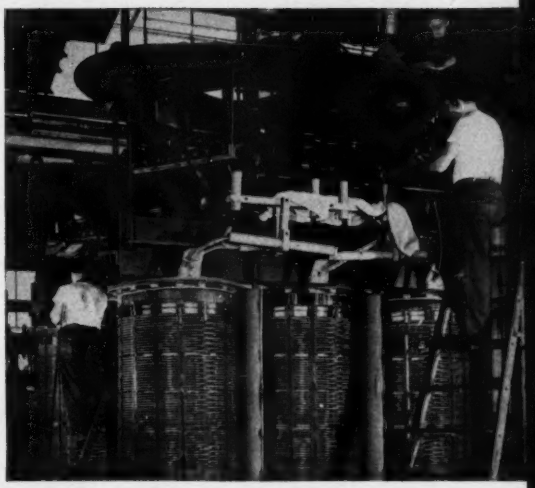
A-C ALLIS-CHALMERS

OREGON UTILITY Boosts Capacity

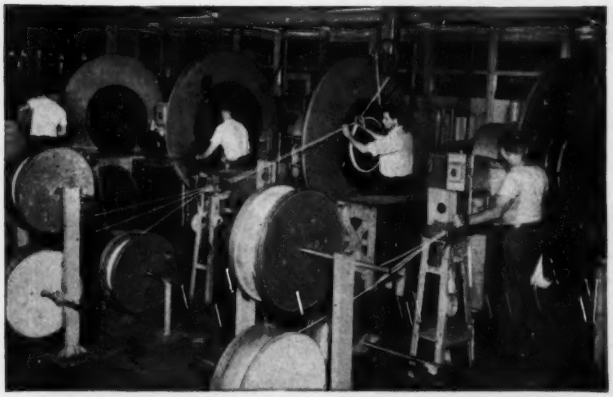
ADDS THREE 6,000 KVA ALLIS-CHALMERS POWER TRANSFORMERS

OREGON RESIDENTS use three times more power than the national average. Records show that 99% of the farms and suburban homes in the area served by the Portland General Electric Company are electrified. And Allis-Chalmers power, distribution and network transformers help PGE — the state's largest electric utility — distribute the power. These 6,000 kva transformers step up capacity for Salem, the capital city of Oregon.

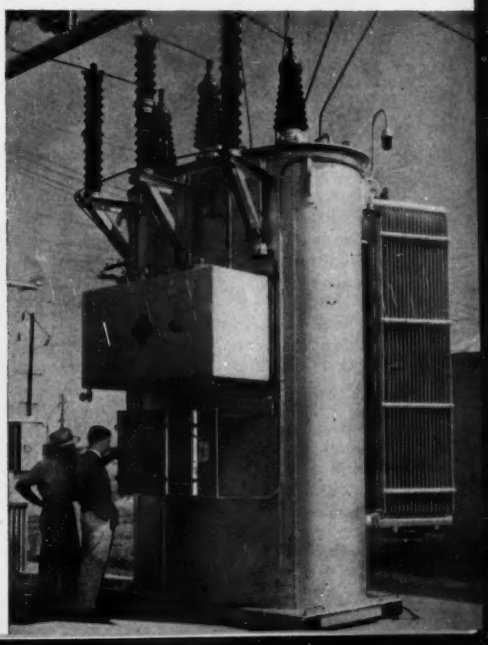
Repeat orders from PGE — and from utilities across the country — are evidence that Allis-Chalmers power transformers are providing dependable, on-the-job service day in and day out. For more details call in your A-C sales representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Offices in 64 principal cities. A-3542



GOOD WORKMANSHIP. Winding and core structure are securely supported and braced. Machine wound tubes, anchored in a sturdy clamping, support and insulate the leads. Good workmanship characterizes assembly work in all stages of transformer assembly.



WINDINGS ARE UNIFORMLY TIGHT. A battery of winding machines winds coils simultaneously from a continuous conductor. This method maintains uniform tightness throughout the winding process and eliminates internal connections. Spacers, uniformly spaced and cemented between coils, give good support and promote coolant circulation.



MORE POWER. This 6,000 kva transformer is one of three Allis-Chalmers power transformers installed at Portland General Electric Company's Middlegrove substation to boost power capacity.

Kallen Goldsberry Bocarde Stengel Webster Schulz Taylor Hayden Webb

Electric Club of Oregon Elects

For the first time in its existence the Electric Club of Oregon has elected as its president an associate member in naming Max O. Taylor of The Oregonian Publishing Co. J. Dan Webster, first vice-president, is with Pacific Power & Light Co. William H. Hayden, second vice-president, is assistant purchasing agent, Portland General Electric Co. George Bocarde, treasurer, is with Pacific Power & Light. S. W. Goldsberry, sergeant-at-arms, is a Westinghouse sales engineer. F. E. Webb, past president, remains on the board. He heads Webb Electric Mfg. Co. H. F. Stengel, Bonneville Power Administration, and George R. Schulz, Garland-Affolter Engineering Co., are executive committeemen at large. Leonard A. Kallen is the executive secretary. Membership of the club now is 433.

Northwest Dates

Dates for the four sections meetings of the Northwest Electric Light & Power Assn. have been announced by Berkeley Snow, executive secretary, as follows:

Engineering and Operating Section, Rainbow Hotel, Great Falls, May 7-9.

Business Development Section, Chinook Hotel, Yakima, May 12-14.

Personnel Section, Vancouver Hotel, Vancouver, B. C., May 19-21.

Accounting and Business Practice Section, Medford Hotel, Medford, May 22-23.

● **Managers** of promotional electric leagues, IEA, NCEB, PCEA, LAEL and B of HA of San Diego, met in San Francisco during market week to compare operating experience and trade promotion ideas for mutual benefit.

● **Seattle** is host to the American Power Assn. convention, April 28-May 1, at the Olympic Hotel.

● **Ed E. Young** took over the reins as president of the Electric League of Los Angeles, succeeding Jack L. Hargrove. Young, secretary-treasurer of Sues, Young & Brown, wholesale distributors, declared a platform of developing more business through promotional programs. Others elected were Al Ayeroff, Ayeroff Bros., executive vice-president; Ken Johnson, Packard-Bell, secretary; Bob Williams, Brand Appliances, treasurer. Glen L. Logan is managing director. Ben Gross, vice-president, NAED, was featured speaker at the annual banquet telling "What the Dealer Wants to Know about Distribution for 1952."

Young Hargrove

Intermountain Officers

Ray Halverson, managing director of Intermountain Electrical Assn. in Utah and Idaho, announced the results of the election of officers: James C. Littlefield, Salt Lake City division manager, Utah Power & Light Co., president; Mark Austin, Sunbeam Corp., vice-president; Joe M. Hansen, Westinghouse Electric Supply, secretary-treasurer. Directors: Wholesalers—Carlos W. Stone; W. J. Berryman; Stan Lakin. Retailers—Boyd A. Read, Ogden; Paul Flandro; Kenneth Brady. Manufacturers—Leonard Slusser; T. L. Stevens; Dean Jenks. Contractors—R. E. Bartlett; E. E. Oberg; J. Vernon Sharp. Utilities—J. F. McAllister; W. O. Cluff; Elmer Jacob. Directors were elected for one- or two-year terms in order to continue experienced directors on the board.

Western league managers who met to exchange ideas during market week were LeRoy Bennett, Glen Logan, Ray Halverson, J. Clark Chamberlain, Vic Hartley and E. Perkins

NOW... A NEW VENTED EXPLOSION-PROOF FIXTURE!

Thanks To Appleton Engineering Skill!

Full-Circle Venting!

60 to 500 WATTS

Listed by Underwriters' Laboratories, Inc., for Class I, Group C and D, Hazardous Locations.

- **Greater Safety**
- **Easier To Maintain; Faster To Service**
- **Maximum Lighting Efficiency**
- **Cooler Operating**

Here's the safest explosion-proof fixture ever designed for hazardous location lighting! Exclusive engineering features combined in the new Appleton AA-51 line make these fixtures safer, more efficient, easier to install and maintain—*years ahead of the field!*

AA-51 full circle venting—use of the entire lower edge of the hood as a continuous louvre—is combined with porous metal interiors to provide much more even heat distribution, *definitely cooler operation.* Special shock-absorbing sockets mean a longer useful life for every lamp bulb. And greater light output—proved by lighting curve tests on every wattage—gives you a bonus of extra light for your money every hour the AA-51 operates!

Wire-free canopy construction in AA-51 canopies permits instant removal of the entire fixture! By exchanging a clean, freshly lamped fixture unit for the one taken down, all actual re-lamping and cleaning may be done in safety at the work bench. No juggling of separate parts while perched on a ladder! Canopies themselves—including ceiling types and long and short bracket types—are standardized, will take any fixture in the AA-51 line, 60 to 500 watts, without rewiring. To safely confine arcs, should current accidentally be left on while removing fixture, five full threads on canopy are engaged whenever contact is made or broken!

The ALL-NEW APPLETON AA-51 SERIES EXPLOSION-PROOF LIGHTING FIXTURE

1. Standardized Canopy
2. Connecting Block with Spring-leaf Contacts
3. Release lug for easy fixture removal
4. Shock-Absorbing Socket
5. Porous Metal Interiors
6. Notches provide screw driver leverage in releasing globe ring
7. Heat and impact-resisting Glass Globe
8. Detachable Reflector

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DENVER 2, 1921 Blake Street

MALLEABLE IRON CONDUIT FITTINGS
CONDUIT BODIES and ACCESS BODIES
Industrial Lighting Equipment
EXPLOSION-PROOF FITTINGS and SWITCHES

APPLETON ELECTRIC PRODUCTS

THE MONTH IN BRIEF

Tacoma Brings Suit on Cowlitz Project

City of Tacoma has asked the Pierce County Superior Court to rule on constitutionality of the State Fish Sanctuary Act, in an action designed to eliminate legal barriers to construction of its $146 million Cowlitz River hydro project. The suit also asks the court to determine the right of the city to issue bonds to finance the project to determine validity of the bonds and to determine "any other questions that may be raised by anyone" as to the right to build the dams and the sale of the bonds. Named as defendants in the action are Robert Schoettler, state director of fisheries, and John Biggs, state director of game. The action was expected to head off suits contemplated by state sportsmen and conservative groups. Meanwhile attempts to discredit C. A. Erdahl in the race for public utilities commissioner in the recent municipal election were unsuccessful. Unofficial primary returns gave Erdahl almost twice as many votes as his opponent, appliance dealer Homer King. A Tacoma newspaper, commenting editorially, declared the vote a mandate from the citizens of Tacoma demonstrating their approval of the operation of the City Light department and, more specifically, plans for expansion as proposed in the Cowlitz projects.

Power Company Buys Steam Plant Site

Pacific Gas and Electric Co. has purchased a 137-acre tract at Buhne Point, three miles south of Eureka, Calif., as site for a steam-electric plant to serve the Redwood Empire.

Arizona Merger Completed

Arizona Public Service Co. started operating March 1, following FPC approval of the merger of Central Arizona Light & Power and Arizona Edison into the new company. Public Service is headed by Henry B. Sargent, with headquarters at Phoenix. With its subsidiary, Northern Arizona Light & Power Co. (which is expected to be liquidated and brought into the Public Service system by mid-summer) it has more than 110,000 electrical customers in a 37,000 sq-mile territory. Plans have been announced for construction of a 200,000-kw steam plant near Redrock in southern Pinal County at a cost of $24 million.

Montana Power Importing Gas from Canada

Montana Power Co. may import up to 10 billion cu ft of natural gas annually from Canada, under an FPC authorization. The gas must be used exclusively for service to the Anaconda Copper Mining Co. The authorization, which expires April 7, 1956, permits Montana Power to import up to 40 million cu ft daily. It will bring the gas from fields in the Pakowki Lake area in southeastern Alberta. The gas will be produced and transmitted in Canada by two Montana Power subsidiaries, Canadian-Montana Gas Co. Ltd. and Canadian-Montana Pipe Line Co. Canadian Province authorization was received prior to the FPC permit.

Four Companies Propose Pipelines to Northwest

FPC will hold a consolidated hearing beginning April 8 in Washington, D. C., on four applications proposing to import natural gas from Canada to Pacific Northwest markets. Northwest Natural Gas Co. of New York City wants to build a pipeline system with a maximum daily delivery capacity of 285 million cu ft to bring Canadian gas to Idaho, Washington and Oregon, with a portion to be returned to British Columbia. Pacific Northwest Pipeline Corp. of Houston, Tex., would link Texas gas reserve areas with gas fields in Alberta and build a 2,175-mile pipeline system from Texas to the State of Washington. This line would have initial capacity of 250 million cu ft per day. Westcoast Transmission Co. Inc. of Wilmington, Del., wants to build 615 miles of pipeline to serve Oregon and Washington markets. The project would have a 221 million cu ft capacity per day in the fifth year of operation. Glacier Gas Co. of Butte, Mont., proposes a 626-mile pipeline to Montana, Idaho and Washington, carrying 25 billion cu ft annually.

SEC Asks Court to Dismiss Order in WWP Case

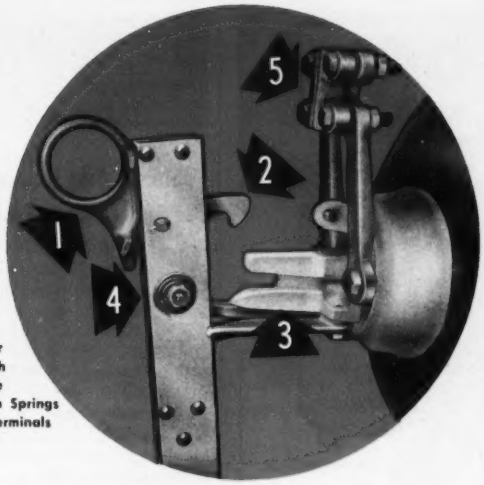
Dismissal of the circuit court of appeals order staying SEC from holding hearings on sale of Washington Water Power Co. common stock to PUDs was asked by SEC counsel in San Francisco on Feb. 18. Joining SEC in the request, which the court took under submission, were the State of Idaho, city and county of Spokane, Electric Bond & Share and two other American Power & Light stockholders. Meanwhile Kinsey M. Robinson, WWP president, told the Security Analysts of San Francisco that, if the company continues in business and is not sold to public power groups, it should be able to earn around $4.2 million in 1953. The estimate includes rate increases applied for and takes into consideration benefits of three projected plants.

Lightning Chief Cause of Outages

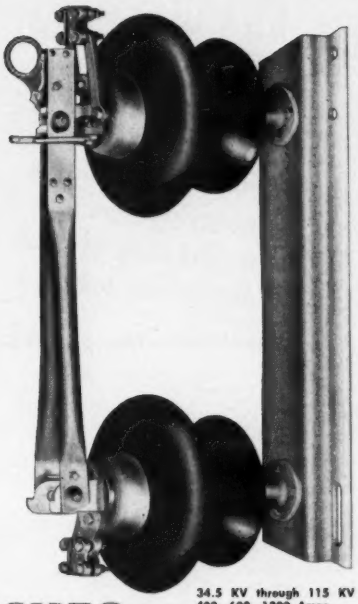
Lightning is the chief cause of outages on lines of 100 kv and above, reports an AIEE committee. Data from 62 utilities in the U. S. and Canada with 689 transmission lines having a total of 33,796 miles of lines above 100 kv, and embracing 236,666 mile-years of operating experience showed that lightning caused 64.6% of the 21,594 outages reported. Of these, 91% were temporary and 67.9% produced secondary effects; 12% produced load loss. Effectiveness of ground wires and low-tower-footing resistance is indicated. Significant is the need for attention toward reducing the seriousness and number of secondary effects resulting from transmission outages.

Infrared and UV Filter

"Infropake" is a new transparent plastic product that is sprayed on the inside of windows to absorb infrared and ultraviolet sun rays, thus cooling the interior while freely transmitting glareless light. Industrial and commercial concerns use it extensively.



1. Pryout Lever
2. Double Latch
3. Split Tongue
4. Compression Springs
5. Universal Terminals



34.5 KV through 115 KV
400, 600, 1200 Amps.

Here's New Sturdiness
in Hook Stick Disconnect Switches
CHANCE BT SWITCHES

Hook Stick Disconnect Switches *have* to be rugged. Heavy side thrusts—when the closing force must be applied from an angle — cause some switch blades to flex and make quick, sure contacts impossible.

That's why CHANCE Hook Stick Switches are designed with emphasis on *really rigid* contact blades—like the double-trussed tubular blade that gives unequalled strength to Chance Switches from 34.5 through 115 KV . . . the heavy flat parallel bus bars that serve as blades in the 23 KV and smaller 1200 amp. switches . . . or the flange-reinforced bus bar blades on the 400 and 600 amp. switches rated 23 KV and below.

In addition to rigid blades, Chance Disconnect Switches have many other features that add up to smooth operation through many years of service. Five of these are shown in the inset above.

1. A downward pull on the extra large ring actuates a powerful pryout lever that works like a claw hammer to break ice accumulations with ease.

2. Double latch hooks lock the blade in position so firmly that even tremendous magnetic forces caused by heavy faults can't make the switch open. The latch is held securely by a non-ferrous, sleet-protected spring inside the blade end.

3. A split tongue contact always centers clip pressure directly over the contact area.

4. High contact pressure is kept constant by bronze compression springs and spherical washers.

5. Chance Disconnect Switches are equipped with time saving universal terminals that fit any conductor size you use.

All Chance switches have flanged bases that will not cut into wood structures and cause constant maintenance problems after installation. All meet NEMA and AIEE requirements and they all have passed Chance engineers' severe tests for high currents, icing, insulation characteristics and long life. Why not get full details today?

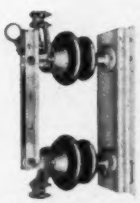
You know it's RIGHT when you specify CHANCE

ABC INDUSTRIES

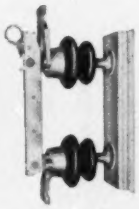
A·B·CHANCE CO·

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

C12-6



7.5 KV through 23 KV
400, 600 Amps.



7.5 KV through 23 KV
1200 Amps.

magno-tronic

DUAL SILVER POINT — FULLY AUTOMATIC

FLUORESCENT STARTERS

-completely eliminate annoying blinking and flickering of dead fluorescent lamps!

GUARANTEED — FOR ONE YEAR!

This is a glow switch condenserless precision starter equipped with automatic thermal relay circuit breaker. The relay automatically removes the lamp from the circuit electrically when the lamp becomes deactivated and automatically resets upon interruption of the lamp circuit.

SIMPLIFIES—Replacement of defective lamp automatically recycles starter circuit. No buttons to push—no replacement of starter.

REDUCES COST—Magno-Tronic starters provide exact timing of electrode heating, preventing excessive loss of emission material, thus assuring maximum possible lamp life.

VERSATILE—Built to operate efficiently over an extended voltage and temperature range.

SP-15-20 For use with 15 or 20 watt lamps.

SP-30-40 For use with 30 or 40 watt lamps.

SP-85-100 For use with 100 watt lamps.

Manufactured under U. S. PATENTS

2298236 2159837 2339307
2334935 2239244 2333694
2341520 1849552

Other Patents Pending

INDUSTRIAL ELECTRONICS CORP.
General Offices & Main Plant, 80 BANK STREET, NEWARK 2, N. J.

Port-A-Pony

featherweight Portable

PIPE THREADER

Truly a feather weight, the Port-A-Pony weighs only 26 pounds and is ideal for threading conduit and pipe in the shop or field. Use the Port-A-Pony to thread any ¼" to 4" pipe in place. The ½ h.p. reversible motor operates on 110 volts AC or DC. Heavy duty case hardened gears are mounted in a rugged magnesium alloy casing. Adaptable to your die stocks. Write for full information today.

THREAD-EZY MFG. CO. CORUNNA MICHIGAN

THIS MONTH'S NEWS

California Asks License For Feather River Project

California has taken another step toward construction of its $1.2 billion Feather River project with the application to FPC by the State Water Project Authority for a license for the $441 million first phase.

The "home-owned," multipurpose development, which would be completely independent of the Bureau of Reclamation's Central Valley project, would eventually distribute Feather River water through an extensive San Joaquin Valley-southern California diversion system. The present application asks for authorization for a $342.6 million dam and a $64.5 million power plant on the Feather River near Oroville; a $14 million Oroville afterbay and power plant, and a $19.7 million transmission line and terminal substation.

The installed capacities of the power plants at the Oroville and the Oroville afterbay dams would be 440,000 and 25,000 kw, respectively.

The terminal substation and switchyard would be located near Bethany in San Joaquin County, about 150 miles south of the power plants. The transmission lines would consist of one single-circuit and one double-circuit steel tower line of 230 kv capacity.

The project would be financed with federal and state contributions, plus power and water revenues.

Change in Chief Joseph Plans Will Save Time, Engineer Says

The entire intake structure in the power house area at Chief Joseph Dam on the Columbia River near Bridgeport, Wash., can be completed at one time under a recently approved change in plans, according to Col. J. P. Buehler, Seattle district engineer for the Corps of Engineers.

Present plans call for completing 16 units under a contract for which bids were to be opened by Colonel Buehler March 12 at Seattle. The new authority allows extending the intake structure to serve 27 units in the power house.

Ultimately, after other proposed upstream dams provide storage, Chief Joseph Dam will have 27 generators with a total capacity of 1,728,000 kw.

Stadium Lighting Installation—Pole base mechanism permits 3-ganged cutouts to be switched from ground.

Combine fuse protection with "disconnect-under-load"

Low-cost G-E oil fuse cutouts give you both

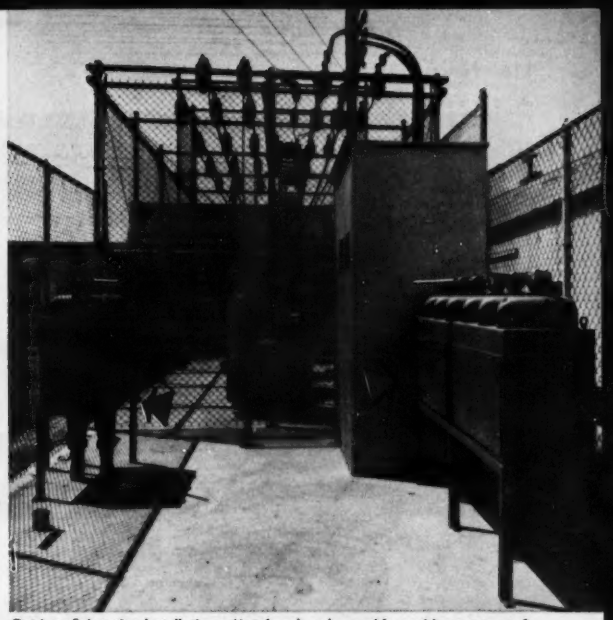
In the G-E oil fuse cutout all arcing occurs under oil when the fuse blows or when switched. The housing, with its drawn steel tank threaded into cast-iron cover, is liberally designed for safety; withstanding internal pressures well in excess of those that can occur at the cutout's interrupting rating. There are no exposed live parts—whether the cutout is in open or closed position—and no expulsion of arc flame.

Special arcing surfaces on the heavy self-aligning contacts keep load-carrying surfaces clean—make it possible to use these cutouts repeatedly as switches to open circuits under loads.

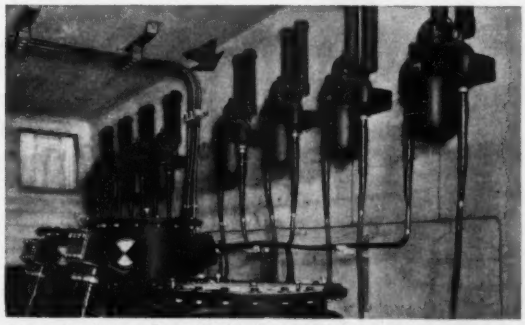
Suitable for both utility and industrial applications, these cutouts are—

1. **Available for 2400-, 4160-, and 7200-volt circuits, current ratings up to 300 amperes; interrupting ratings up to 11,000 amperes.**
2. **Ideal for indoor mounting, vault or subway mounting and outdoor pole or wall mounting.**
3. **Available in metal enclosed assemblies, single or three-phase, rack or wall mounted, and providing for cable, conduit, or pothead connections.**
4. **Provided with switching mechanisms for single- or three-phase switching and pole base operation on rack-mounted or metal-enclosed units.**

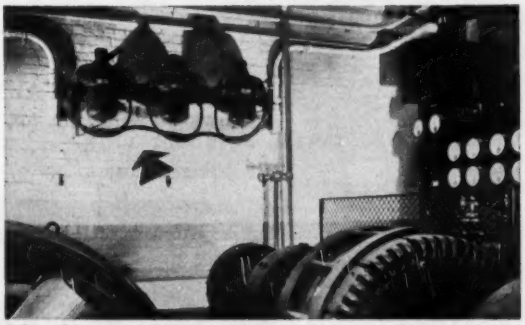
Full information can be found in Bulletin GEA-732—available through your G-E Apparatus Office, or by writing, *General Electric Company, Schenectady 5, New York.*



Outdoor Substation Installation—Metal enclosed assembly avoids exposure of cable entrances and gang-operated mechanism provides for simultaneous switching.



Subway Installation—Expansion chambers attached to cutouts permit complete submersion.



Indoor Substation Installation—Oil cutouts in incoming lines provide high current fusing.

406-40

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

No. 2 in a Series

THE PREDOMINANT QUESTION IN THE MINDS OF MANY PURCHASING AND CONSTRUCTION DEPARTMENT EXECUTIVES TODAY IS——

when will we get the material needed to complete our construction program?

HERE'S OUR ANSWER...

Speaking for ourselves as a manufacturer and supplier of insulators, clamps and fittings, our records show that **BY JANUARY 1952, WE HAD SHIPPED ALL ORDERS PROMISED FOR DELIVERY DURING 1951** . . . a schedule made possible through the use of new, improved and *exclusive* Pinco production techniques and methods. We are mighty proud of this fine record. And our customers are mighty happy too. So If *you* want the best in porcelain, for delivery when you need it—put your problems up to Pinco! We will welcome the opportunity to prove that Pinco as always, is "RIGHT ON THE JOB."

The Porcelain Insulator Corporation
LIMA, NEW YORK

WAREHOUSED AND DISTRIBUTED BY JOSLYN PACIFIC CO.
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PINCO INSULATORS
RIGHT ON THE JOB

QUESNEL HYDRO PROJECT STALEMATED IN B. C.

Proposal by the B. C. Power Commission to develop hydro electric power at Quesnel, B.C., has been stopped. This was a proposal in the 1949 election campaign and the government later approved a $5 million interest-free loan to the B. C. Power Commission to proceed with the project.

The development was to have been the basis of a pulp and paper industry in the area, as well as to provide electricity to serve interior communities.

The B. C. Power Commission proposed to develop the south fork of the Quesnel River. The Federal Department of Fisheries opposed this on the ground that it has spent thousands of dollars trying to rehabilitate the Quesnel River salmon run and urged the commission to develop the north fork. The commission considered this development too expensive and the project reached a stalemate. An alternative proposal would be to bring surplus power to the Quesnel area from the big Nechako development, which is underway by the Aluminum Co. of Canada.

Concrete Work Under Way on Cabinet Gorge Hydro Dam

Concrete placing for the Washington Water Power Co.'s $40 million Cabinet Gorge hydroelectric dam on the Clark Fork River in Idaho is proceeding at the rate of about 1,000 cu yd per 24-hour day, with about 66,000 yd already placed and the bulk of the arch-shaped dam expected to be completed by April 1.

Concrete production will be nearly doubled when another batch plant goes into operation soon. The dam now is half complete and on schedule, according to the Morrison-Knudsen Co. Inc., contractors. The first of four 50,000-kw generators is scheduled for service Sept. 1.

● **Los Angeles Department of Water & Power** has awarded a $3,372,999 contract for construction of a steam turbine generator to the General Electric Co. The generator is the third to be ordered for the department's $71 million steam plant now under construction. Rated at 156,250 kw, it is to be installed by the fall of 1954. The two 100,000-kw units previously ordered, both from Westinghouse, are to be in operation by the fall of 1953.

OUT with Costly Outages!

GET PERMANENT DEEP-DOWN PROTECTION WITH Copperweld

SECTIONAL GROUND RODS

Removable stud bolt takes driving blows
Threaded bronze coupling
Any of these Copperweld Sectional Rods may be used as a top, intermediate, or bottom section. They are roll-threaded on both ends.
As each Copperweld Sectional Ground Rod is driven, the next rod is joined to it by means of a heavy bronze coupling, and the driving procedure is then repeated. It's as simple as that.

In most localities deep grounding will provide low resistances more economically than multiple shallow grounds. More and more engineers are turning to Copperweld* Sectional Ground Rods for this deep-down protection. These superior ground rods do the job quickly, permanently and at low cost.

Copperweld Sectional Ground Rods have a stiff alloy steel core to provide the rugged strength for easy driving. This core is permanently protected from corrosion by a thick, molten-welded layer of copper having high conductivity. No other ground rod has this inseparable molten-weld which eliminates the possibility of electrolytic action.

Whether you drive only a few lengths by hand or penetrate the earth's sub-surface with the aid of a power hammer, you can do it quicker, better, and at low cost with Copperweld Sectional Ground Rods. And at the same time, you'll get permanent and consistent low-resistance grounding protection against costly outages.

*Trade Mark

HOW TO DRIVE DEEPER AND AT LOW COST

Equipped with a demountable steel framework supporting a Barco gasoline hammer, this truck is demonstrating that effective, low-resistance deep grounding can be accomplished in a simple, economical manner with Copperweld Sectional Ground Rods. You can readily duplicate this rig in your own shops. Complete plans will be mailed to you upon request.

Made by
COPPERWELD STEEL COMPANY
Glassport, Pa.

Pacific Coast Office
Monadnock Bldg., San Francisco

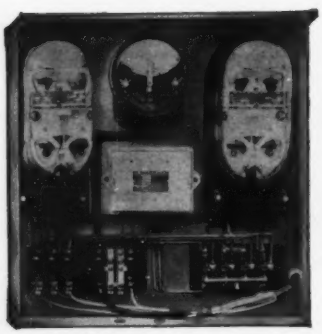
THEY'RE MOLTEN-WELDED Copperweld GROUND RODS

Stocked And Sold By:

HUBBARD AND COMPANY • JOSLYN MFG. & SUPPLY CO.
And All Their Distributors

KEES
POLYPHASE
METER BOXES

L16-W



No. 24-W-2 Front removed

KEES polyphase outdoor meter boxes feature knockouts for all probable hook-ups for polyphase meters, primary metering, time switches, and recording instruments. Front forms more than one-half the sides and bottom. Equipment can be reached from sides as well as from front. Weatherproof, waterproof front is hinged at top, easily detached. Latch may be sealed, and locked.

Write Dept. ELW-5 for free catalog.

Since 1874

F.D.KEES
MANUFACTURING
CO.
BEATRICE, NEBRASKA

TEST DRILLING CONTRACT LET ON PELTON PROJECT

A contract for test drilling at the Pelton dam site on the Deschutes River in central Oregon has been awarded by Portland General Electric Co. to Diamond Drill Contracting Co., Spokane, Wash. After six weeks of drilling at the main site, test drilling operations will be transferred to location of the reregulating dam three miles downstream.

The threat of the Oregon state fish commission to bring legal action to prevent construction of the dam will not interfere with this survey work. John C. Veatch, chairman of the commission, reported that the state would not begin the proposed action until work that will interfere with the stream's flow is started.

PUD May Use Private Capital To Build Transmission Line

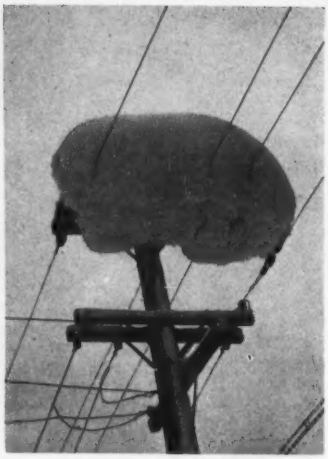
Rather than wait for an REA allocation, the Clallam County PUD of Port Angeles, Wash., is considering the use of private capital to construct a $650,000 transmission line from Port Angeles to Forks, according to Manager Carl Miller.

Construction could begin earlier if revenue bonds were sold to private capital, Miller believes, although interest rates would be slightly higher. The PUD earlier received REA funds to construct a hydroelectric project on the Hoh River, but has abandoned this project and has been awaiting formal approval from the REA to use Hoh River allocation for the transmission line. If private capital is secured, the PUD will ask the REA to cancel the allocation, Miller said.

The bonds would be retired from revenues in the area to be served by the line, perhaps necessitating higher rates in the area served by the 69,000-v line until the line's cost is amortized. Adequate private capital is available, said Miller.

The PUD had hopes to secure aid from the Bonneville Power Administration in construction of the line, but a cooperative plan failed to clear the BPA budget department in Washington, D.C.

● **A $1 million REA loan** received recently by the Chugach Electric Assn. of Anchorage, Alaska, will allow the association to add 363 new rural consumers and a total of 20 additional miles of distribution lines, as well as to complete previously approved generating facilities.



Snow pack on pole of California Oregon Power in Dunsmuir, Calif., area. Snow had unloaded from wires which were heavily loaded in worst conditions experienced in 25 years by District Manager O. G. Steele

● **The Inlet Power & Light Co.,** operating in the Eastchester area adjacent to Anchorage, Alaska, has offered to sell its generating and distributing equipment to the city of Anchorage. The area is likely to be annexed to the city shortly. Value of the company's generating facilities, including land and buildings, is set at $354,082, while distribution facilities, meters, office equipment and trucks are valued at $465,763.

● **The Salt River Valley Water Users** Assn. and Power District has set aside an 83-acre site east of Phoenix, Ariz., for an employee recreational area. Bordered on one side by a canal feeding the association's steam power plant near Tempe, the area will be supervised by the association's Employee Recreational Association and will include as a starter, picnic tables, shelters, rest rooms, clubhouse, swimming pool and a dance pavilion. Later additions planned include a golf course, baseball diamonds and surfaced parking area.

● **Higher electricity rates** in the Greater Vancouver-lower mainland-southern Vancouver Island area covered by British Columbia Electric Co. have been approved by Public Utilities Commission. New rate schedules provide no increase for monthly bills less than $3 and a maximum increase of $1 per month, based on an increase in the second, 60-260-kwh, rate step from 2 to 2.5c per kwh.

POINTING the WAY To Continuing Prosperity

The set of figures in the middle of this page is news of high importance to every American.

In effect, it says that there is no basis in fact for all this talk about a collapse of capital expenditures plunging us into a depression following the industrial build-up for defense.

Such talk assumes that without defense orders business would spend relatively little for new industrial plant and equipment. The figures below show that that assumption is not justified.

penditures in 1953, 1954 and 1955, provided the money to carry them out can be obtained.

A Record in '52

As was expected, their plans call for another record-breaking volume of capital expenditures by business in 1952. But, as many did not expect, the McGraw-Hill survey also discloses plans for very heavy capital expenditures in each of the three years following. Expenditures now planned for those years are, to be sure, lower than those planned for 1952. But the significant fact is not that

BUSINESS PLANS FOR NEW PLANTS AND EQUIPMENT (Millions of Dollars)

	Actual Spending 1950*	Actual Spending 1951*	McGraw-Hill Survey			
			Planned	— Preliminary Plans —		
			1952	1953	1954	1955
Manufacturing	7,491	11,141	12,921	10,028	8,525	8,194
Mining	684	806	943	415	321	358
Railroads	1,136	1,564	1,642	1,248	1,117	1,002
Electric & Gas Utilities**	3,298	3,676	3,948	3,360	3,204	2,748
Other Transportation & Communications	1,392	1,592	1,721	1,671	1,943	1,839
ALL INDUSTRY	14,001	18,779	21,175	16,722	15,110	14,141

*U. S. Department of Commerce
**Electrical World (A McGraw-Hill publication) and American Gas Association.

The figures come from the fifth annual McGraw-Hill survey of business plans for new plant and equipment. Companies were asked to report through that survey not only their plans for 1952, but plans they now have in hand for capital ex-

they are lower. Experience shows that plans made several years ahead always overlook many expenditures that are needed later.

The significant fact is that the expenditures already planned for 1953-55 are so high. For example,

those now planned for 1955 would be higher than those of 1950, which, at that time, were second highest in our history.

If these plans are carried out we shall have an essential element of continuing prosperity. Sustained expenditures for capital expansion and betterment account directly for a large share of our employment and consumer income. Moreover, consistent modernization of industrial plant raises production efficiency and brings more and better goods and services within reach of more consumers.

It is not to be expected, of course, that we can come down from the peak of the defense boom without readjustments in some sectors of business. But if capital expenditures by business are carried out on the scale now planned, we shall be able to take any necessary readjustments in our stride, and continue to increase our industrial strength.

From V-J Day to the end of this year, manufacturing industries will have spent over $60 billion for new industrial plant and equipment. This is more than the value of all the plant and equipment these industries had on their books at the end of World War II. It is this heavy outlay that causes some, assuming most postwar plans for industrial expansion and modernization will be completed, to fear a collapse of capital expenditure.

Plans to Go Ahead

But American industry still has plans to go right ahead expanding and improving its facilities. This was the most striking single finding of this year's survey.* It disclosed also that after 1952:

— 83 per cent of the companies answering the survey are planning substantial further modernization.

— 48 per cent will need more capacity to make their present products.

— 33 per cent plan additional capacity to make new products.

It cannot be too strongly emphasized, however, that these plans represent what American industry *wants* to do. They are a concrete expression of hope and aspiration. As such they are extremely important, for they dispose of the idea that business considers the job of expanding and improving its facilities as finished, or anywhere near finished.

But the plans carry no guarantee of accomplishment. If they are to be realized, business must have the funds to carry them out. There is no assurance that the money will be available if the present level of corporation taxes is continued. Eight out of ten companies, according to the McGraw-Hill survey, will rely entirely on profits and reserves to finance their 1953-55 programs. So, in calculating their programs for these years, the companies were asked to assume relief from "excess profits" taxation.

Federal taxes now take at least 52 per cent of a corporation's profits, and 82 per cent of any profits in the so-called "excess profits" bracket. Despite this drain on their funds, companies are able to finance their 1952 programs because (1) they are borrowing heavily, and (2) many of them are getting government loans or special tax concessions on new facilities installed for defense purposes. But these are emergency aids.

Only Two Ways

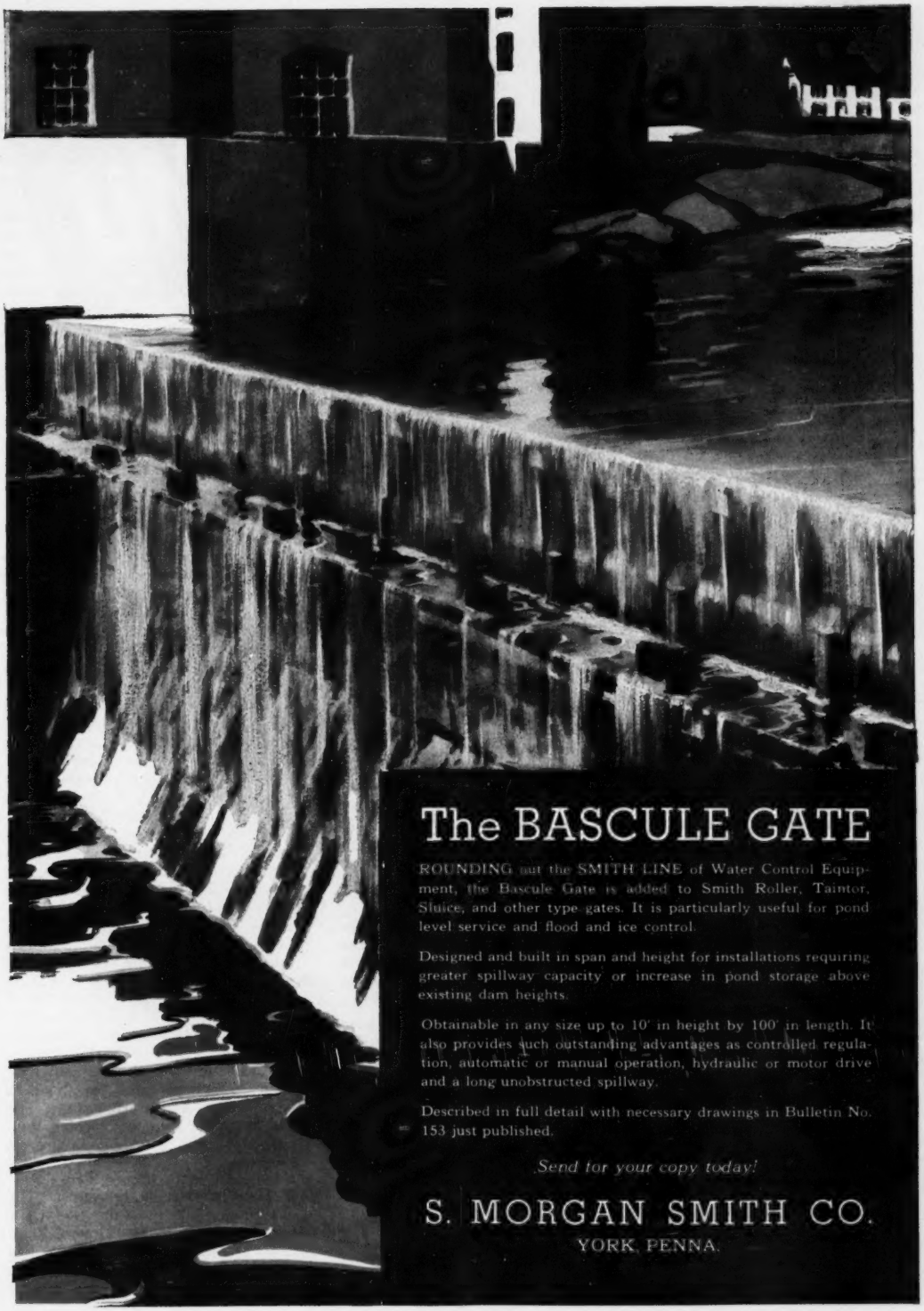
When the present defense program tapers off, there will be only two ways by which business can possibly increase its principal source of funds for new plant and equipment. One way is to make more profits before the tax collector takes his cut. And the only way many companies, already operating at capacity and high efficiency, can do that quickly is by raising their prices. That is an unpopular method. Also, with the return to more competitive markets, it might be self-defeating.

The other way is for the federal government to release its strangle hold on business profits. The so-called "excess profits" tax—the 82 per cent tax which is really a tax on business growth—should be repealed, effective January 1, 1953. And a cut in the basic tax of 52 per cent on all corporate profits should come not much later. That is by all odds the most important single step toward assuring that business plans already made for capital investment in 1953, 1954 and 1955 are carried out. It is the most important single step toward sustaining our present prosperity.

Through its plans for continued expansion and improvement of its facilities, American business clearly points the way to avoid the depression that so many have feared — and the Communists have so ardently hoped — would follow the peak of defense mobilization. It will be a tragedy for our country and for Americans in every walk of life if we do not insist that business get the chance to follow this wise and constructive course.

McGraw-Hill Publishing Company, Inc.

*Note — A copy of the full report of this survey can be obtained by addressing: Department of Economics, McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York 36, N. Y.



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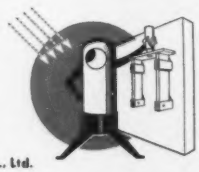

USBR EXPECTS SAVING FROM OFFICE CONSOLIDATION

Consolidation of Bureau of Reclamation planning offices in Walla Walla, Wash., and Kalispell, Mont., into a single office in Spokane was scheduled for February. An annual saving of about $30,000 is expected from the single-office operation. The new office will handle the bureau planning program for western Montana, northern Idaho, western and central Washington and parts of eastern Oregon. Among the major investigations to be undertaken are the Clark Ford Basin project in Montana and Idaho, the Rathdrum Prairie project in northern Idaho, the Foster Creek project in north central Washington, the Greater Wenatchee project near Wenatchee, and the Baker project in eastern Oregon.

New Dam Site Studied On Columbia River

Federal government engineers in Canada will investigate another dam site on the Columbia River, five miles downstream from Castlegar where Celgar Development Ltd., Celanese Corp. of America subsidiary, is planning a $65 million pulp-newsprint project.

The new investigation is labeled as "purely a reconnaissance survey." The Celanese pulp-newsprint project plans to take its power from Consolidated Mining & Smelting Co.'s East Kootenay Power & Light development on the Pend Oreille River.

In other investigations on the Columbia last summer, federal engineers reported good results in boring for dam foundations at a canyon near Mica Creek, 80 miles north of Revelstoke. The Mica Creek plan involves turning the Big Bend of the Columbia into a huge power basin.

● **Disposal** of Seattle properties of Puget Sound Power & Light Co. during the year reduced the company's net income 11.8% to $3,538,308, reports President Frank McLaughlin. This amounts to $1.62 per share, as against $1.84 the previous year. The 11.8% reduction in net income compares with a 20% reduction in gross revenues.

● **The Pennsylvania Transformer** Co. of Cannonsburg, Pa., submitted a low bid of $216,870 to the Corps of Engineers at Seattle for three 13,500-kva transformers to be installed in the Albeni Falls Dam power house.

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BPA BUDGET REQUEST TOTALS $74,296,000

Bonneville Power Administration's budget request for fiscal 1953 will total $74,296,000 and will center on construction of transmission facilities, according to Dr. Paul J. Raver, administrator.

Estimates for the new fiscal year beginning July 1, 1952, represent an increase of $1,427,961 over appropriations for the current fiscal year and include $63,600,000 for new construction, $4,096,400 for prior year contract liquidation, and $6,600,000 for operations and maintenance, Raver said.

Initial construction is proposed on four new major 230,000-v grid lines in fiscal 1953, a circuit from McNary Dam to Big Eddy near The Dalles to serve Portland and southwest Oregon load centers, two circuits from Chief Joseph Dam to northwest Washington, and a circuit from La Grande to Baker, Ore., providing interconnection with southern Idaho power resources.

Most important new construction of 115,000-v facilities includes service for the Tillamook County area from Forest Grove, and a short interconnecting transmission line to integrate Albeni Falls Dam with the Columbia River grid.

Transmission facilities now under construction will transmit power from Hungry Horse and Detroit Dams where initial generation is scheduled in fiscal year 1953. Other facilities will help relieve critical loading of present grid lines from Bonneville and Grand Coulee, now carrying peaks of over 2,700,000 kw.

Budget requests for major 230,000-v grid additions total $50,172,000 and include Grand Coulee-Midway line 3, Grand Coulee-Columbia lines 3 and 4, Columbia-Olympia line 3 and facilities, Covington substation additions, Snohomish-Kitsap line, Grand Coulee-Snohomish line 2, Chief Joseph-Snohomish lines 3 and 4, McNary-Big Eddy-Troutdale, McNary-Big Eddy-Ross, McNary-Maupin-Detroit, Detroit-Albany, Detroit-Chemawa, Ross-St. Johns conversion, Midway-Big Eddy-Maupin-Detroit, Detroit-Albany, southwest Oregon loop lines and facilities, Coos Bay area service, McNary switching station, McNary-La Grande-Baker line and system reactive facilities.

Budget requests for area facilities include:

Northwest Washington-Puget Sound area, $1,856,000—Shelton Kitsap-Bremerton line 2, Bellingham substation, Quinault service, Tacoma tap, and Raymond-Aberdeen line.

Portland-Longview-Chehalis area, $1,782,000—North Bonneville substation additions, Troutdale substation additions, Longview area service, Chehalis substation additions, Clark County service, J. D. Ross substation additions, Forest Grove-McMinnville, Salem-Boyer, Westport-Cathlamet lines, Astoria substation additions, and Tillamook service.

Southwest Oregon area, $1,565,000—Eugene-Reedsport line, Detroit substation, Toledo substation additions, McKinley-Gold Beach, Lebanon-Springfield, Middle Fork Willamette River projects, and North Santiam Valley lines and facilities.

Northeast Washington area, $779,000—Spokane substation additions, Spokane-Colville-Spirit line, Four Lakes service.

Idaho Panhandle, $745,000—Bonners Ferry-Troy-Albeni Falls loop, Troy and Newport substations.

Central Washington, Central and Eastern Oregon, $4,047,000—Columbia substation, Columbia-Ellensburg line, Franklin substation additions, Okanogan and Ferry County, Richland-Kennewick lines and facilities, service to aluminum plant at Wenatchee, Midway substation additions, The Dalles-Goldendale, Columbia Basin service, Warden substation, Orondo substation, Moxee switching station, The Dalles Dam service, Quincy substation, Franklin County service, Valhalla-Keokuk, Rocky Ford-Soap Lake, and Moses Lake lines and facilities.

Western Montana area, $2,020,000—Hungry Horse-Hot Springs line, Hot Springs switching station, Hot Springs-Anaconda line 1, Hot Springs-Spokane line 1.

General structures, communications, tools and equipment, and operations facilities, $4,730,000.

● **FPC** has issued a 50-year license to PUD No. 1 of Pend Oreille County, Wash., for its proposed Box Canyon hydro development on the Pend Oreille River. The project will include a dam about 260 ft long at the site, north of Ione, Wash., forming a reservoir extending upstream about 55 miles to the Albeni Falls development of the Corps of Engineers. The power house will contain four vertical 24,500-hp turbogenerator units. Cost is estimated at $16 million.

● **PUD** No. 1 of Lewis County, Wash., has been granted a one-year preliminary permit by FCC for a hydro project near Packwood.

ENGINEERS CALL BIDS ON FOLSOM POWER PLANT

Bids for construction of Folsom power plant on the American River 20 miles east of Sacramento, Calif., were advertised by the Bureau of Reclamation Feb. 13 in Denver. The plant will have a generating capacity of 162,000 kw and will be tied in to the Central Valley project system.

The bid call covers construction of a reinforced concrete main power plant building of semiunderground type, embedding three 74,000-hp hydraulic turbines, installation of steel penstocks to carry water from the Folsom reservoir to the turbines, completion of a trailrace channel already partly excavated, and installation of other items of equipment in and around the power plant.

Other work to be performed by the contractor includes construction of a control cable tunnel from the plant to the switchyard site, an access road to the plant, parking area, and dry rock paving to protect slopes.

Work on the Folsom power plant must be completed 790 calendar days from receipt of notice to proceed.

Temporary Rate Increase Taken Under Submission

Pacific Gas and Electric Co.'s request for a temporary electric rate boost, amounting to about $17 million, pending action on its application for a permanent increase of $37,586,000, has been taken under submission by the California Public Utilities Commission. Hearings were held in San Francisco Feb. 6 and 7. Arguments on the permanent increase will be heard again on March 26 and April 23.

The proposed interim rate increase would give PG and E a 5% return from its electric department, as compared to the present rate of 4.2%. The permanent increase application asks for a 5.8% return.

Ralph W. DuVal, PG and E attorney, argued that it would be months before detailed hearings could be completed on the permanent increase and that meanwhile the company's earnings were inadequate. He said if some relief is not obtained, the company's credit might be impaired and its $450 million three-year construction program be imperiled.

Protesting the increase were a group of cities, six counties, OPS, the California Grange, the California Manufacturers' Assn. and the California Farm Bureau Federation.

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Air cargo tonnage passing through New York International Airport increased so rapidly during recent years that existing facilities were heavily over-burdened, until The New York Port Authority opened the new Cargo Operations Building late in 1951.

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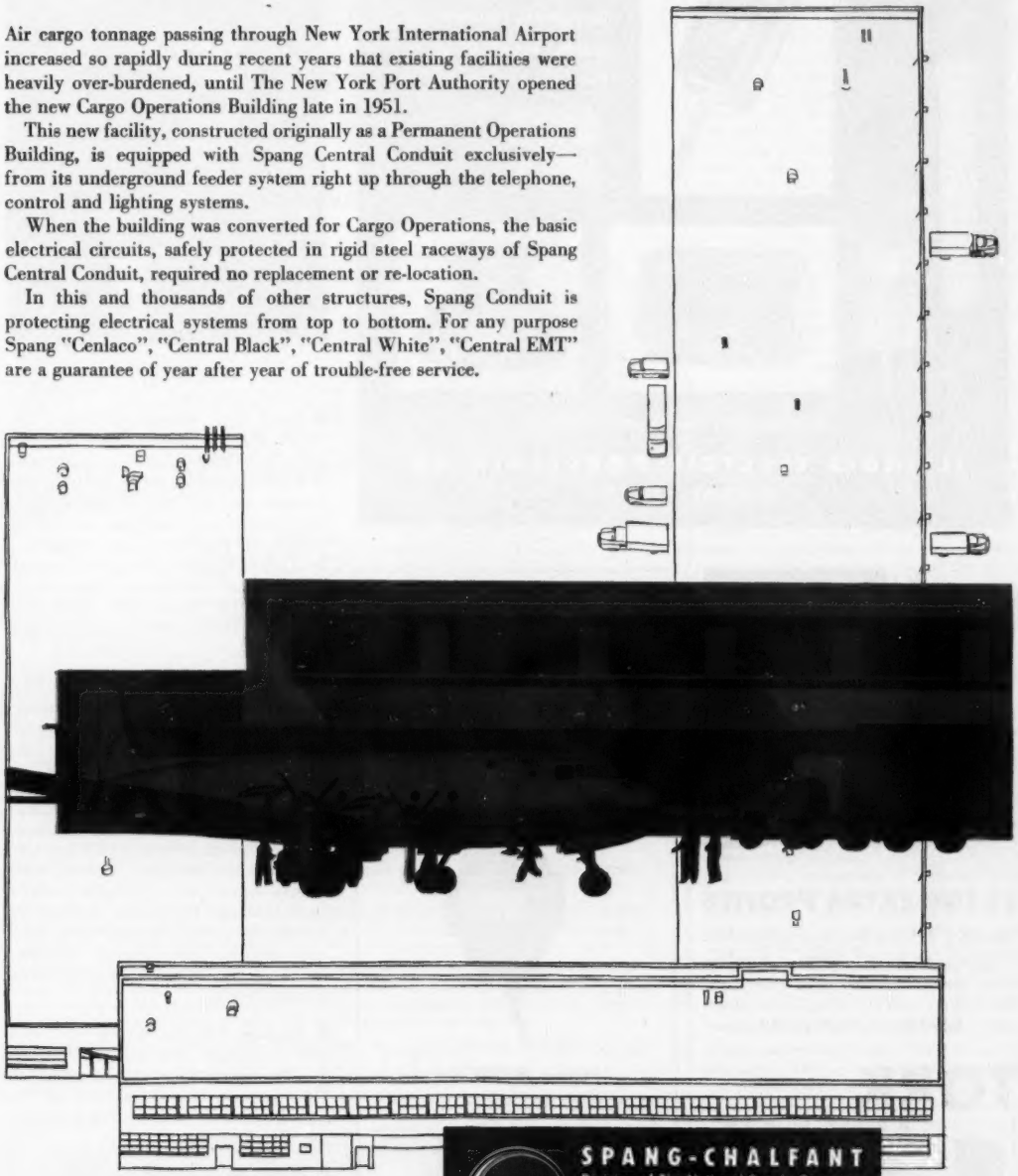

Owner: The Port of New York Authority.
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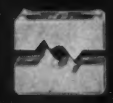

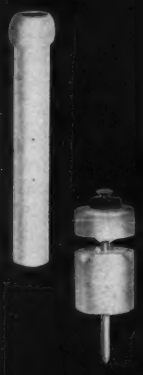

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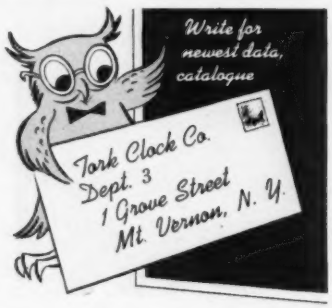

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NOTES ON THE TRADE

Kindorf

● **Steel City Electric** Co. of Pittsburgh, Pa., has acquired the Kindorf Co. of Oakland, Calif., manufacturers of hangers and supports for pipe and conduit and other devices. The Oakland plant will continue to operate under the Kindorf name, supervised by **Orlan Kindorf,** founder, according to W. I. Patterson, chairman of the board of Steel City. Steel City makes electrical boxes and conduit fittings.

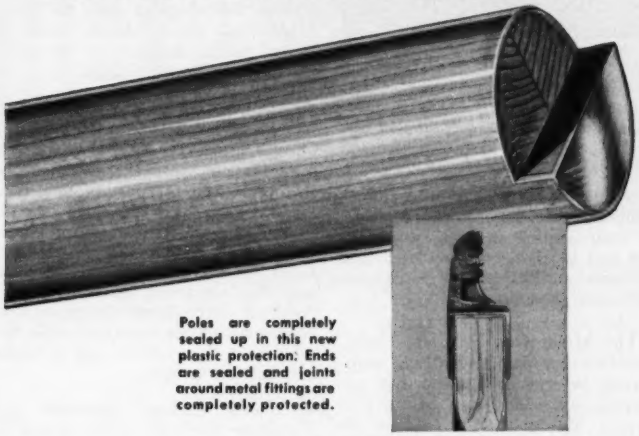
● **Reorganization** of the Benbow Mfg. Co., manufacturer of insulated trolley busways, has been completed and the firm has moved from Redwood City to a new plant at 1285 Rollins Road, Burlingame, Calif. According to **Tirey L. Ford,** president, the company has overhauled products and methods of distribution since its new management was installed in 1950. Former sales outlets have been replaced with a coast-to-coast system of engineering organizations that handle both sales and service. The original 100-amp walking shoe safety trolley has been re-engineered.

● **Lemoge Electric,** which for years and years had been at 281 Natoma St., San Francisco, has moved to 212 Clara St. It was founded by Vic Lemoge and is now operated by his son, Fay Lemoge.

● **Name** of J.Z. Wholesale Electric of Huntington Park, Calif., has been changed to Argo Electric Supply Co. The firm is a supplier of electrical material to contractors and industry.

CHANCE MAPLAC* Plastic Protected HOT LINE TOOLS

cut tool maintenance costs!



Poles are completely sealed up in this new plastic protection. Ends are sealed and joints around metal fittings are completely protected.

Now, Chance lightweight, aluminum-fitted Hot Line Tools are protected with a new super-tough plastic finish called "Maplac"* that greatly reduces tool maintenance and helps to keep tools in safe working condition.

This new plastic protection has many plus features of real value to hot stick users:

TOUGHNESS to withstand any impact or abrasive action encountered in normal use.

TRANSPARENCY that permits initial inspection and periodic checks.

MECHANICAL STRENGTH–Chance "Maplac," being extremely tough, does not require sacrifice of pole size and strength to gain the necessary thickness. It adheres to the wood surface and reinforces the pole adding to the factor of safety.

TEMPERATURE RESISTANCE–retains its toughness under widely varying temperatures.

ELECTRICAL RESISTIVITY– exceeds the voltage withstand tests of the wood insulation (complete safety, however, depends on the moisture content of the wood–no plastic will completely prevent absorption of moisture vapor).

MOISTURE RESISTANCE–Chance "Maplac" retards the absorption of atmospheric vapor in high humidity and protects the wood from precipitation moisture (this does not mean that plastic covered poles are recommended for use in the rain–but that Chance "Maplac" greatly reduces moisture penetration.

REPAIRABILITY–may be repaired without heat or special tools if cut by a sharp blow.

All this at NO INCREASE IN PRICE! Specify Chance "Maplac" Plastic Protected Tools.

* TRADE NAME

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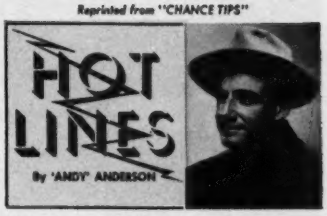

Using hot sticks for the last thirteen years in forty-eight states and five Provinces of Canada has shown me the need for some good tough covering for these tools. We demonstrators try to set a good example in caring for tools by the way we handle them in use. We also carry them in trailers where we can take better care of them than you can by hauling them in bags or thrown loose on trucks. Even with the care we give them, it's almost impossible to keep from scarring these important tools in use or in hauling and storing them. We have to have our hot sticks refinished twice a year. This costs money even if it is a rainy day job with many of you.

About five years ago, I began putting the bite on our Research Department for something better. Since plastics were used in everything from toys to heavy machinery, we figured some type could be used on hot sticks. After a lot of arguments, experiments, tests and headaches, they now have me thoroughly convinced that "Maplac" is the answer.

I don't know what the stuff is, but it's tough, strong, light and looks good. It's clear as cellophane so you can see the grain of the wood and inspect the pole right through the plastic.

This Chance "Maplac" coating doesn't mean that hot sticks can now be thrown around in the truck or on the ground like a shovel or sledge hammer. They're tough but you still have to watch out for surface dirt or moisture.

Chance "Maplac," like any other plastic, will absorb moisture but this action is much slower on a "Maplac" covered pole than on the old-type stick treated with pole preservative. By the same token, it also takes longer to dry out the new pole. Our Engineering Department tells me there is nothing—even glass—that moisture won't eventually penetrate.

The biggest advantage of Chance "Maplac" protected tools is the saving in stick maintenance. Take the same care of these new sticks that you took with the old and your hot stick maintenance will come way down. Also you'll have sticks that always look good—sticks that men will be proud to use.

SEND FOR A SAMPLE

If you would like to inspect this new plastic protection, send us a postcard, or attach the coupon below to your letterhead.

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Please send a sample of your new plastic protection.

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This scale-model factory, developed by Westinghouse Electric Corp. in connection with its "More Production Ahead" program, toured the West in January and February. Pictured at Oakland, Calif., showing, J. L. Wagoner, moderator and conductor of program, uses display to show how better use of present equipment and skillful application of new apparatus can help increase production and lower costs under today's shortage conditions

● **Columbia-Geneva Steel** division of U. S. Steel has been awarded a Certificate of Cooperation and a citation signed by Acting ECA Administrator Richard M. Bissell Jr. for "furnishing technical assistance to the Peoples of the Marshall Plan countries to aid them in maintaining individual liberty, free institutions and peace."

● **J. C. McDougall** of the Seattle firm of the same name has been appointed sales representative in most of the State of Washington for Fenwal Thermoswitch units and Dect-A-Fire. The McDougall company is at 520 First Ave. S., Seattle 4.

● **Eric Ackland & Associates** Ltd., 535 Homer St., Vancouver, B.C., has been appointed exclusive agent in British Columbia for all special lighting fixtures manufactured by Western Lighting Fixtures Co. Ltd. of Vancouver.

● **Zidell Machinery & Supply Co.,** 3121 S.W. Moody St., Portland, Ore., has set up a new transmission and distribution utility equipment division and has named Harry Swerdlik as its manager. Swerdlik was with Gilbert Brothers in the same capacity for six years.

● **United States Rubber Co.,** Naugatuck Chemical division, has established a new plant on Telegraph Road in Los Angeles to expand manufacture and sale of rubber latex and plastic materials on the West Coast. The plant will be the division's Western sales headquarters and will contain customer technical service laboratories, facilities for compounding and storage of natural and synthetic rubber latex and for warehousing resins, plasticizers, and other products.

● **The Miller Co.,** Meriden, Conn., manufacturer of industrial and commercial lighting equipment, has appointed Manufacturers Marketing Service, Menlo Park, Calif., as its sales representative for the southern California-Arizona area. **Jack Wade,** who has been in charge of the territory, has been transferred to the Buffalo district. **C. W. McDaniel** is general manager of Manufacturers Marketing Service, which maintains field sales offices in Los Angeles, San Francisco, Portland, Salt Lake City and Denver. Before organizing the service in 1945, he was vice-president in charge of sales and advertising for Fostoria Pressed Steel Corp. and he was one of the organizers of the NEMA lighting section. **R. J. Inhof,** southern division manager of Manufacturers Marketing Service, is in direct charge of Miller sales in that territory and in Arizona.

● **Colorado Springs Supply Co.,** 121 W. Cucharras, Colorado Springs, Colo., has been given a franchise to handle the 1952 line of Mitchell window-type room air conditioners.

● **Sues, Young & Brown** Inc., Los Angeles wholesale distributor, has appointed **Ashby Starr** as advertising and sales promotion manager, succeeding **Peter Frank,** who resigned in February. Starr formerly headed his own advertising agency in Los Angeles.

● **U. S. Electrical Motors** Inc. has announced plans for a $3,500,000 manufacturing plant in Orange County, Calif., with construction to start in early 1952. Site of the plant will be 85 acres midway between Anaheim and Buena Park, 20 miles from Los Angeles. Construction will include a 50,000-sq-ft administration building and 250,000 sq ft of covered manufacturing area. On completion, this unit, the first of several planned for the future, will employ some 1,500 persons. U. S. Electrical Motors has two plants in operation at present, one in Los Angeles and the other in Milford, Conn. Marsh, Smith & Powell of Los Angeles are the architects for the new buildings.

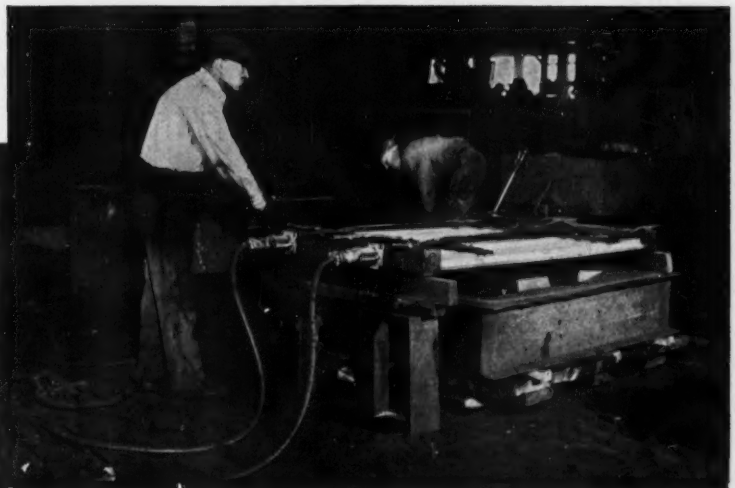
● **Afton-Lemp Electric** Co. of Boise has appointed **Mel Lansing** as appliance manager. Lansing was with with Harper-Meggee of Portland for five years and for part of that time was sales manager of the Bendix division. His experience also includes two years with Crosley Distributing Corp. He was most recently in retail appliance work with Black Frost Co., Portland. Afton-Lemp distributes supplies, major appliances and table appliances in the southern half of Idaho and eastern Oregon.

● **Mack's Garland Appliance** and Furniture store has been opened in the suburban business district of Spokane at Monroe and Garland Ave. **L. R. Buckley** will manage the new store, which is owned by **George L. Mack,** owner and operator of the Hillyard Furniture Co., N. 5118 Market St.

● **Bethlehem Pacific Coast Steel Corp.** has appointed **Colby Howe** as manager of its bolt and nut sales, according to **Harvey Hewitt,** vice-president in charge of sales. Howe, formerly in the Seattle district, will be headquartered in the company's general offices at San Francisco.

● **Columbia-Geneva Steel Division** of U. S. Steel Co. has established a new sales district, with headquarters in Denver and with **Herbert E. Fryer** as manager. The district embraces Colorado, Montana, New Mexico and Wyoming.

● **Maurice Harp** has joined Lenkurt Electric Co., San Carlos, Calif., as applications engineer for development of FM and single-side-band space-carrier equipment.



TIREX HELPS TAKE THE BUBBLES OUT OF STEEL CASTINGS

Foundries "skin dry" molds so that the molding sand will not give off a gas and cause bubbles or porosity in the casting.

Until a short time ago it was common practice in most foundries to skin dry molds with an open kerosene torch. It was slow, hot, dirty, disagreeable work and a moment's inattention could result in a burned and spoiled mold.

A Milwaukee foundry decided to get rid of this dirty, slow job of skin drying molds. They had infrared ray heaters developed. These heaters not only did away with the drudgery of the job but gave the foundry several unexpected dividends. First, the labor of the man drying the mold was eliminated. Second, spoiled molds became a thing of the past. But better still, because the infrared ray heaters were faster than the open kerosene torches, it was possible to dry an additional mold each day and that is a considerable dividend.

Of course the infrared ray heaters demanded a dependable pathway for power and that they got in TIREX Cables. This picture shows TIREX Cables connected to the heaters. TIREX not only operates dependably day in and day out but it safely combats the sharp abrasive foundry sand, it eliminates the danger from cable fires caused by flying molten metal sparks, and it takes in its stride the everyday abuse that is part of the job.

Isn't that the kind of service that you want from your portable cords or cables? Of course it is! This kind of service was deliberately built into TIREX Cords and Cables. They are a product of Simplex research.

Simplex research gave you the first heavy duty, rubber-jacketed portable cord or cable; the first low water absorption insulation; the first rubber-jacketed underground cable. Besides these notable "Firsts" Simplex research has provided a great many developments which have enriched the art of cable design.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

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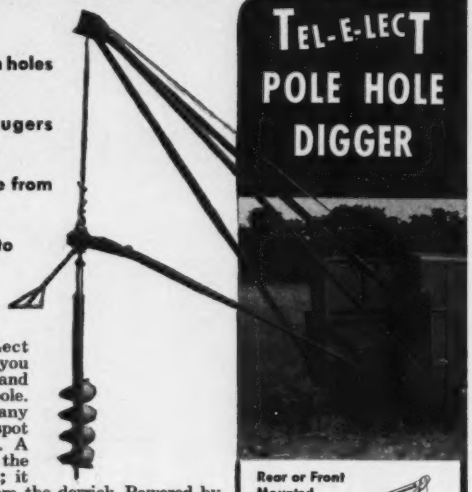
SIMPLEX WIRE & CABLE CO. 79 SIDNEY ST. CAMBRIDGE 39, MASS.

Operates ON ANY DERRICK TRUCK

TEL-E-LECT POLE HOLE DIGGER

- Adjustable for clean holes to 10 ft. deep
- Interchangeable augers 8" to 20" diameter
- Drills a straight hole from any truck position
- Easy to use—easy to transport



WITH the Tel-E-Lect Pole Hole Digger, you use the same truck and crew that sets the pole. You can drill a hole any place that you can spot the pole derrick. A single bolt attaches the digger to the truck; it works suspended from the derrick. Powered by the truck motor through a power take-off shaft, Tel-E-Lect digger is raised and lowered by the winch line. Fits the budget of even the smallest utility or contractor, and quickly pays for itself.

Send For Specifications Bulletin

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THOMAS INSULATORS

For long life and quiet operation choose Thomas "Q-T" insulators. There's one for every operating voltage.

Geo. E. Honn Co.
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This big strong, heavy duty Sherman Solderless Lug is a favorite everywhere. It's easy to install, and it makes an efficient, permanent connection. Extra thread plate for strength. Floating pressure pad attached to screw. Serrated gripping surfaces. Sizes up to 500m CM. Write for catalog!

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Battle Creek, Michigan

H.B. Sherman MANUFACTURING CO
BATTLE CREEK, MICH.
ELECTRICAL FITTINGS FOR WIRE and CABLE

NEWS ABOUT PEOPLE

● **R. E. Gale,** Boise, has been named a vice-president of Idaho Power Co. A graduate of the University of Washington in electrical engineering and a veteran of the first World War, Gale has been associated with the company for 27 years in engineering, sales and administrative work. He became general sales manager in 1936, assistant to the president in 1949, and is a member of the company's board of directors.

● **Sol E. Schultz,** chief engineer, has been appointed acting assistant administrator to **Paul J. Raver,** Bonneville power administrator, effective March 1. He replaces **D. L. Marlett,** who resigned to join the executive staff of the Great Lakes Carbon Corp., New York. Schultz, who will also continue his work as chief engineer, went to Bonneville in 1939. He was previously chief engineer for the Port of New York Authority and was also associated with Stevens and Wood Inc., engineers for the Commonwealth and Southern Corp.

● **Edward M. Schindeldecker** is now Pacific Southwestern district manager for General Mills' home appliance sales department. He replaces **George A. Gillespie.** Schindeldecker will have headquarters in Los Angeles. **Henry S. Kingman Jr.** has been made special field representative for the Pacific central district, with headquarters in San Francisco.

● **Elmer Bogen,** employed by Puget Sound Power Co. since 1935, has been appointed the company's local manager at Ferndale, Wash. He succeeds **Martin Nelson,** who resigned. Bogen had been at Bellingham since 1943, first as a farm consultant and later as a dealer representative.

● **Everett D. Andrews,** Boise, succeeds **Telesphore L. Bourbonnais** as Idaho Power Co.'s system relay technician. Bourbonnais left the company to accept an appointment from DuPont at the Atomic Energy Commission's Savannah development.

● **Fred L. Barber** has been added to the northern California staff of the O. B. Wilt Co. to handle sales in northern California. He formerly was sales manager of Pacific Telecoin.

Announcing IM-50 Watthour Demand Meters

New single-phase meters now available with indicating or cumulative registers

General Electric's I-50 meter line has been extended to include the IM-50 watthour demand meter. Primary applications are for small commercial and industrial loads.

WITH M-30 INDICATING REGISTERS, you are assured of positive reset by Geneva action . . . with no shock. These registers have a long, 9½-inch scale. There are no springs, latches, or governors. Reset load on the motor is low . . . and motor life is long. This unit, with a minimum number of parts, provides maximum flexibility for all indicating demand measurements.

WITH M-31 CUMULATIVE REGISTERS, these meters provide an indication of maximum demand plus the cumulative value of previous maximum demands.

All construction features of I-50 watthour meters are also included . . . magnetic suspension, butyl and polyethylene insulation, and others.

For more information, contact your G-E representative or write Section 601-52, General Electric, Schenectady 5, N. Y.

NEW IM-50 METERS are available for socket or front connections. They can be used on circuits where voltage is either 10% above or below rated meter voltage. Registers are available separately.

GENERAL ELECTRIC

601-52

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Officially opening Los Angeles' Water and Power Week, honoring the Department of Water & Power's 50th Anniversary, Duncan Shaw, president of the Board of Water & Power commissioners, slices into the birthday cake. Looking on are Rosemary Jeimbroni, student council secretary, Los Angeles Trade-Technical Junior College, whose students baked the cake; Charles P. Garman, chairman of the week's general committee and chief electrical engineer of the department; Samuel B. Morris, general manager and chief engineer. Twelve hundred attended the civic luncheon, main event of the week.

● **For outstanding work** in the field of hydroelectric development, **John C. Boyle,** vice-president and general manager of the California Oregon Power Co., has been named Oregon's Outstanding Engineer of 1951 by the Professional Engineers of Oregon. He was awarded a Certificate of Merit at the recent annual meeting of the group in Portland. Boyle has been with Copco and its predecessor, Siskiyou Electric Power Co., since 1910. Under his management demand increased about 400%—from 60,000 kw during the middle of 1944 to 245,000 kw in December 1951. Acting as both manager and chief engineer, he directed studies involving power potentials of all streams within the company's service area, which led to the development along the North Umpqua River in southwestern Oregon, where two plants are now in operation and six under construction. The eight plants have a total name plate rating of 183,500 kw and anticipated full load output of 198,000 kw. Boyle is also making plans for development on the Klamath River.

● **William E. Keeney,** supervisor of the Seattle City Light meter division, retired Dec. 31 after more than 46 years of service with the department. He began working as a wireman helper in 1905, just five months after City Light began operating the city's street lights, and became a meter engineer in 1918.

● **L. B. Stacey,** district manager of Packard Electric Co. Ltd., Vancouver, has been elected president of the British Columbia Assn. of Professional Engineers. Stacey is a graduate of University of B. C., where he was assistant professor of electrical engineering. **John C. Oliver,** Vancouver city engineer, was elected vice-president. He is a former registrar of the association. Council members for next year are: **R. A. McLachlan,** past president and chief engineer of the Pacific division, Dominion Bridge Co.; **J. S. Kendrick,** assistant manager, Aluminum Co. of Canada; **R. E. Potter,** member of the Public Utilities Commission; **J. H. Steede,** assistant chief engineer, British Columbia Electric Co.; and **F. R. Killam,** managing director, Industrial Coatings Ltd.

● **James Moore Evans** has been made construction management engineer at the Edwards Air Force Base at Edwards, Calif., formerly known as Muroc. Evans, who has held supervisory engineering design positions with the Navy, shipyards and government installations during the past several years, at one time was electrical engineer for the Board of Fire Underwriters of the Pacific at Los Angeles.

● **Hugh Smith** has been appointed sales department lighting specialist by the Vancouver Lighting Co. Ltd., 926 Hastings St., Vancouver, B. C. He was for the past four years with Curtis Lighting of Canada Ltd. at Toronto and served during the war with the Royal Navy Fleet Air Arm. Smith is a member of the IES.

● **Ernie Cunningham,** formerly with the Ridgeview Hardware and Furniture Co., has been appointed manager of the electrical department of Mc. & Mc. at Vancouver, B.C. **Ted Dinsley** has taken Cunningham's place with Ridgeview Hardware and Furniture.

● **William D. Ross,** 21-year veteran with National Electric Products Corp., has been advanced from San Francisco district manager to area manager.

● **Louis Buchman** has been made a vice-president and director of Kennecott Copper Corp., with headquarters in Salt Lake City.

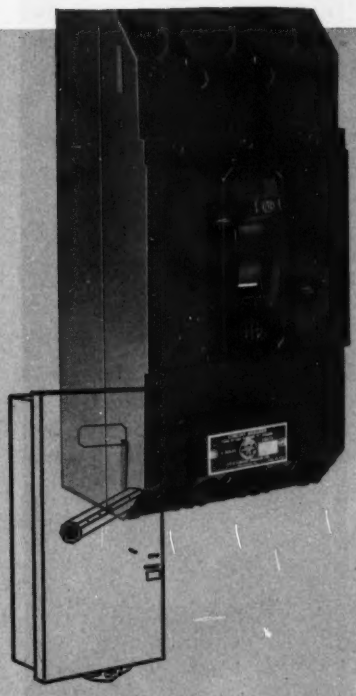
Deaths

● **Ben W. Creim,** formerly located in the West and since 1950 administrator of the Southeastern Power Administration, Elberton, Ga., died Feb. 5. He was former power manager for the Sacramento, Calif., region of the USBR, and from 1939 to 1942 was on the Bonneville staff, serving successively as assistant chief engineer, head engineer and principal engineer. A veteran of both World Wars, he was buried in the Arlington National Cemetery.

● **Jacob J. Eberhard,** 43, electrical engineer for Pacific Gas & Electric Co. at San Jose, Calif., for 15 years, died of a heart attack Feb. 10 at his home in Santa Clara. A graduate of the University of Santa Clara, he served in the Navy during World War II and held the rank of lieutenant commander.

● **Gaskil Jacobs,** formerly publicity director of Hawaiian Electric Co. and prior to that with San Joaquin Light & Power Co., died Feb. 22.

When production is lost -your profits are lost!



Profitable production depends upon continuous operation of equipment. Circuits that control costly capital equipment require the type of protection that only circuit breakers can give. Loss of production—through electrical interruptions, must be minimized by the swift restoration of service that only circuit breakers can give.

Industrial-type circuit breakers cut down-time because the operator can immediately reset them. Risk of machine damage is greatly reduced because circuit breakers are *pretested* to their rated value and repeated operation will not change their calibration. I-T-E breakers will carry their full rated load indefinitely. Circuit breakers are completely safe for operators and maintenance men because no live parts are exposed.

I-T-E Molded Case Circuit Breakers are designed and built for industrial use by circuit breaker specialists. Every breaker in the complete I-T-E line is as ruggedly built for its duty as the heaviest machine tool is for *its* work. Don't risk expensive production delays—specify I-T-E Molded Case Circuit Breakers!

I-T-E offers a complete line of industrial type Molded Case Circuit Breakers; in ratings up to 600 volts a-c, 250 volts d-c; 10 to 600 amperes. All ratings are available in four types of enclosures.

For further information on I-T-E Circuit Breakers, see your local distributor, or write I-T-E Circuit Breaker Co., 19th and Hamilton Streets, Philadelphia 30, Pa.

Install I-T-E MOLDED CASE CIRCUIT BREAKERS

I-T-E CIRCUIT BREAKER CO. • 19th and HAMILTON STS. • PHILA. 30, PA.

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PROFILES

Trudy Winter

Ethel S. Howard

Ethel Sanborn Howard, executive secretary of the Los Angeles Electric Club for 25 years before her marriage to Arthur H. Howard, Tri-State Supply, is now spending her time planning a house and garden in Pasadena, Calif. Her successor, Mrs Trudy Winter, was formerly with Sues, Young & Brown

Ray W. Turnbull, G-E commercial vice-president for the Western area, received his 40-year service certificate in San Francisco last month. George Montgomery, a director, presented certificate at a luncheon given by the managerial group in the area

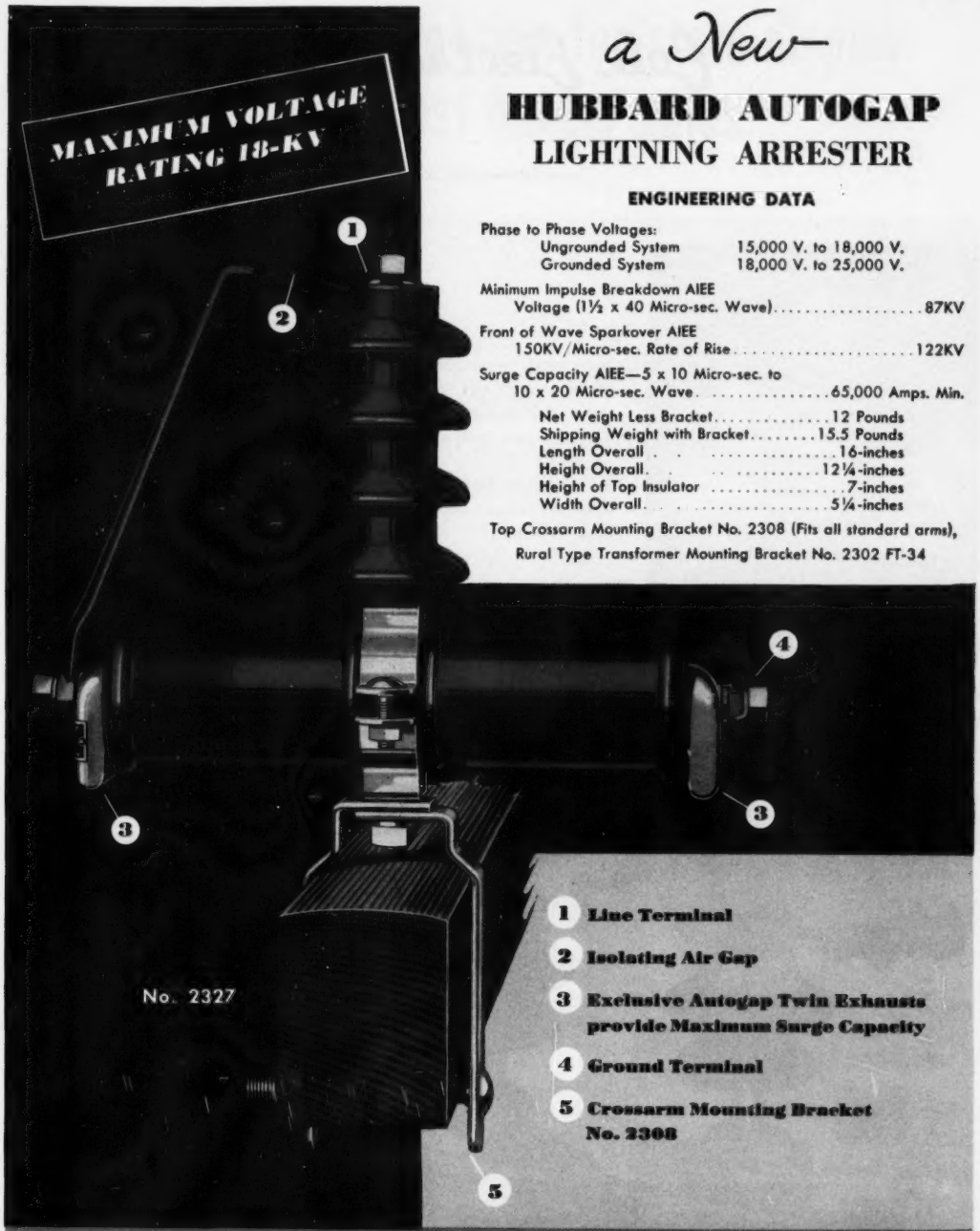
Joseph H. Cox, designer of the Ignitron rectifier, recently was made engineering manager, Westinghouse Sunnyvale plant

C. D. DuBois will head the consolidated Midwestern-Western sales division of Thor Corp. Division headquarters will be in the Western Merchandise Mart, San Francisco

Montgomery Turnbull

DuBois

Cox



a New

HUBBARD AUTOGAP LIGHTNING ARRESTER

ENGINEERING DATA

Phase to Phase Voltages:
- Ungrounded System — 15,000 V. to 18,000 V.
- Grounded System — 18,000 V. to 25,000 V.

Minimum Impulse Breakdown AIEE Voltage (1½ x 40 Micro-sec. Wave) 87KV

Front of Wave Sparkover AIEE 150KV/Micro-sec. Rate of Rise 122KV

Surge Capacity AIEE—5 x 10 Micro-sec. to 10 x 20 Micro-sec. Wave ..... 65,000 Amps. Min.

- Net Weight Less Bracket ..... 12 Pounds
- Shipping Weight with Bracket ..... 15.5 Pounds
- Length Overall 16-inches
- Height Overall 12¼-inches
- Height of Top Insulator 7-inches
- Width Overall 5¼-inches

Top Crossarm Mounting Bracket No. 2308 (Fits all standard arms), Rural Type Transformer Mounting Bracket No. 2302 FT-34

1. **Line Terminal**
2. **Isolating Air Gap**
3. **Exclusive Autogap Twin Exhausts provide Maximum Surge Capacity**
4. **Ground Terminal**
5. **Crossarm Mounting Bracket No. 2308**

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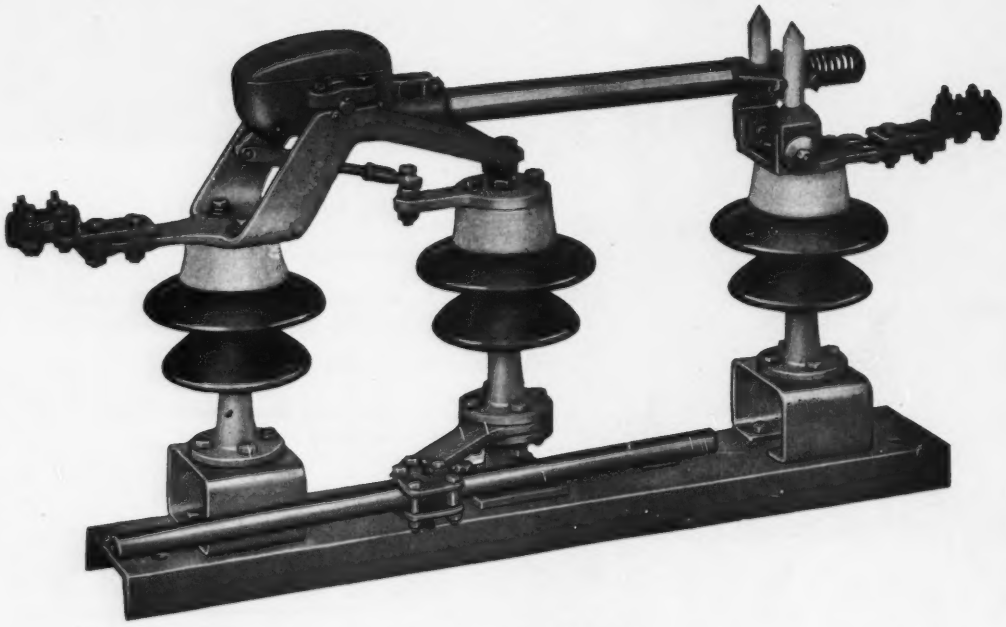
"Hang the Load on Hubbard Hardware!"

Cole Electric Co.

8439 Steller Drive Culver City, Calif.

TExas 0-4701

Tests made in our laboratory under severe icing conditions show the switch illustrated below, closed (left) and after opening (right). Ice was over 1 inch thick: Only 450 inch pounds were required to open switch.



AIR BREAK DISCONNECTING SWITCH
15,000 Volts, 600 Amperes, Type O-2
Vertical Break, Three Pole, Single Throw, Group Operated
SILVER TO SILVER CONTACTS

"Special lighting for store display helps boost bakery sales"

—Report on Beck's Bakery, Bakersfield

Ceiling fixtures and wall case lights improve display of bakery goods at Beck's

Does good lighting pay profits? Since Mr. and Mrs. Raymond Beck opened their new bakery at 2900 F Street, Bakersfield, last June, sales have increased, and summer receipts were almost as high as in peak winter months.

The new store has been designed to make illumination an integral part of the interior. The result is attractive display of goods and a fresh, bright atmosphere. The Becks report that from the manufacturing area of the bakery to the sales floor, their new lighting has paid off handsomely.

Whatever your business
Good Lighting Is a Good Investment

Increases production, sales

Reduces waste

Keeps employees happy, efficient

Reduces accidents

Increases cleanliness

For a survey of your lighting and ideas on how better lighting can help you, call the lighting engineer at your P. G. and E. office, or consult your contractor or engineer.

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PACIFIC GAS AND ELECTRIC COMPANY

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it's a good cause...

and it's *yours!*

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If that isn't a good cause, we never heard of one. And it's *your* cause if you're connected with the industry in any way. As a person who wants to *do something* for your own good and the good of the entire electric industry, you belong in P.C.E.A. As a member, you belong in the particular P.C.E.A. activity which best suits your time, talent and interest. Ask either of our offices for further information.

WRITE FOR YOUR FREE COPY of the booklet, "Your P.C.E.A. and How It Operates." That's a good way to get started, and now is a good time.

PACIFIC COAST ELECTRICAL ASSOCIATION

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